5-3805-239-12

TM 5-3805-239-12

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

OPERATOR AND ORGANIZATIONAL MAINTENANCE MANUAL

LOADER SCOOP TYPE, PNEU-TIRED, DIESEL ENGINE DRIVEN, HINGED FRAME STEER, WITH 2½ CU YD MULTI-PURPOSE BUCKET, ALLIS CHALMERS MODEL 645M

FSN 3805-051-9359

This copy is a reprint which includes current pages from Changes 1 through 7.

HEADQUARTERS, DEPARTMENT OF THE ARMY
JULY 1968

D101.11:

READEX FICHE best copy available

SAFETY PRECAUTIONS

BEFORE OPERATION

Keep equipment free of oil, grease, and dirt to insure nonslip control

Do not smoke or use an open flame in the vicinity when servicing the batteries. Batteries generate hydrogen, a highly explosive gas.

Check loader before starting. Make sure area is clear of personnel before moving loader. Sound horn before moving loader.

Never move loader if low air warning buzzer is sounding or until air pressure gage indicates between 75 and 125 psi.

Remove cold weather starting aid cylinder when loader is to be operated in warm climates to prevent inadvertent injection of fluid into the engine.

Do not crank engine more than 30 seconds continuously without allowing a two minute cooling off period.

DURING OPERATION

Do not operate loader inside unless in a well ventilated area.

Report or correct any conditions that may result in injury to personnel or damage to the machine if operation is continued.

Operate machine at speeds consistent with conditions of the particular job.

Do not use bucket as a brake.

Never get on or off a loader that is in motion. Do not permit anyone to ride on the outside of the loader. Watch for ground crew or other personnel on foot while moving the machine.

Do not move clutch cutoff leaver unless brake pedal is fully released.

Do not down shift from high range to low range at speed in excess of 5 mph.

AFTER OPERATION

Always lower bucket to the ground when loader is not in use. Place all levers in neutral position.

Set parking brake when parking loader. Block wheels when parking on a grade.

Report or correct any conditions that may result in injury to personnel or damage to the machine.

Stop machine and shutoff engine before lubricating, adjusting, or servicing. Always install safety locking bar before servicing.

Keep equipment free of dirt, grease, and oil.

Before servicing any part of the loader electrical system, disconnect the battery ground cable.

Exercise caution when removing the radiator cap while engine is hot. Quick removal may allow hot coolant to escape and may cause serious injury to personnel.

This loader is not designed as a pull vehicle and when using it under these conditions may cause extreme overheating of the oil in the hydraulic system. This condition may shorten the life of all hydraulic components and possible bursting of hose assemblies that may cause serious injury to personnel.

If it becomes necessary to use the loader as a towing vehicle for any sustained length of time, periodically exercise the loader hydraulic controls through all positions, to raise, lower, dump and retract the bucket. This will circulate the oil throughout the hydraulic system and reduce the possibility of extreme over heating.

Changes in force: C 1, C 3, C 4, C 5, C 6 and C 7

TM 5-3805-239-12
C 7

Change No. 7

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, DC, *5 July 1974*

Operator and Organizational Maintenance Manual
LOADER, SCOOP TYPE, PNEU-TIRED, DIESEL ENGINE DRIVEN, HINGED FRAME STEER, WITH 2 1/2 CU YD MULTI-PURPOSE BUCKET, ALLIS CHALMERS MODEL 645M
FSN 3805-051-9359

TM 5-3805-239-12, 5 July 1968, is changed as follows:
Inside Front Cover. Add the following warnings to the list of safety precautions:

WARNING

Operation of this equipment presents a noise hazard to personnel in the area. The noise level exceeds the allowable limits for unprotected personnel. Wear ear muffs or ear plugs which were fitted by a trained professional.

WARNING

Dry cleaning solvent, P-D-680, used to clean parts is potentially dangerous to personnel and property. Do not use near open flame or excessive heat. Flash point of solvent is 100°F. - 138°F.

Page 1-2. Paragraph 1-1*d* is superseded as follows:

d. You can help to improve this manual by calling attention to errors and by recommending improvements. Your letter or DA Form 2028 (Recommended Changes to Publications and Blank Forms) should be mailed direct to: Commander, US Army Troop Support Command, ATTN: AMSTS-MPP, 4300 Goodfellow Boulevard, St. Louis, MO 63120. A reply will be furnished direct to you.

Page 2-1. Immediately after Chapter 2 title, add the following warning:

WARNING

Operation of this equipment presents a noise hazard to personnel in the area. The noise level exceeds the allowable limits for unprotected personnel. Wear ear muffs or ear plugs which were fitted by a trained professional.

Page A-1, paragraph A-5. Add the following reference: "TB MED 251, Noise and Conservation of Hearing".

By Order of the Secretary of the Army:

CREIGHTON W. ABRAMS
General, United States Army
Chief of Staff

Official:

VERNE L. BOWERS
Major General, United States Army
The Adjutant General

Distribution:

To be distributed in accordance with DA Form 12-25B. (qty rqr block No. 401) Operator maintenance requirements for Loaders.

Changes in force: C 1, C 3, C 4, C 5 and C 6

TM 5-3805-239-12
C 6

CHANGE
No. 6

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C. *16 January 1974*

Operator and Organizational Maintenance Manual

LOADER, SCOOP-TYPE; PNEUMATIC TIRED; DIESEL ENGINE DRIVEN; HINGED-FRAME STEER; WITH 2 1/2 CU. YD. MULTI-PURPOSE BUCKET (ALLIS-CHALMERS MODEL 645M) FSN 3805-051-9359)

TM 5-3805-239-12, 5 July 1968 is changed as follows:

Page i. Table of Contents, section XIV, the title is changed to read: "Propeller Shafts".

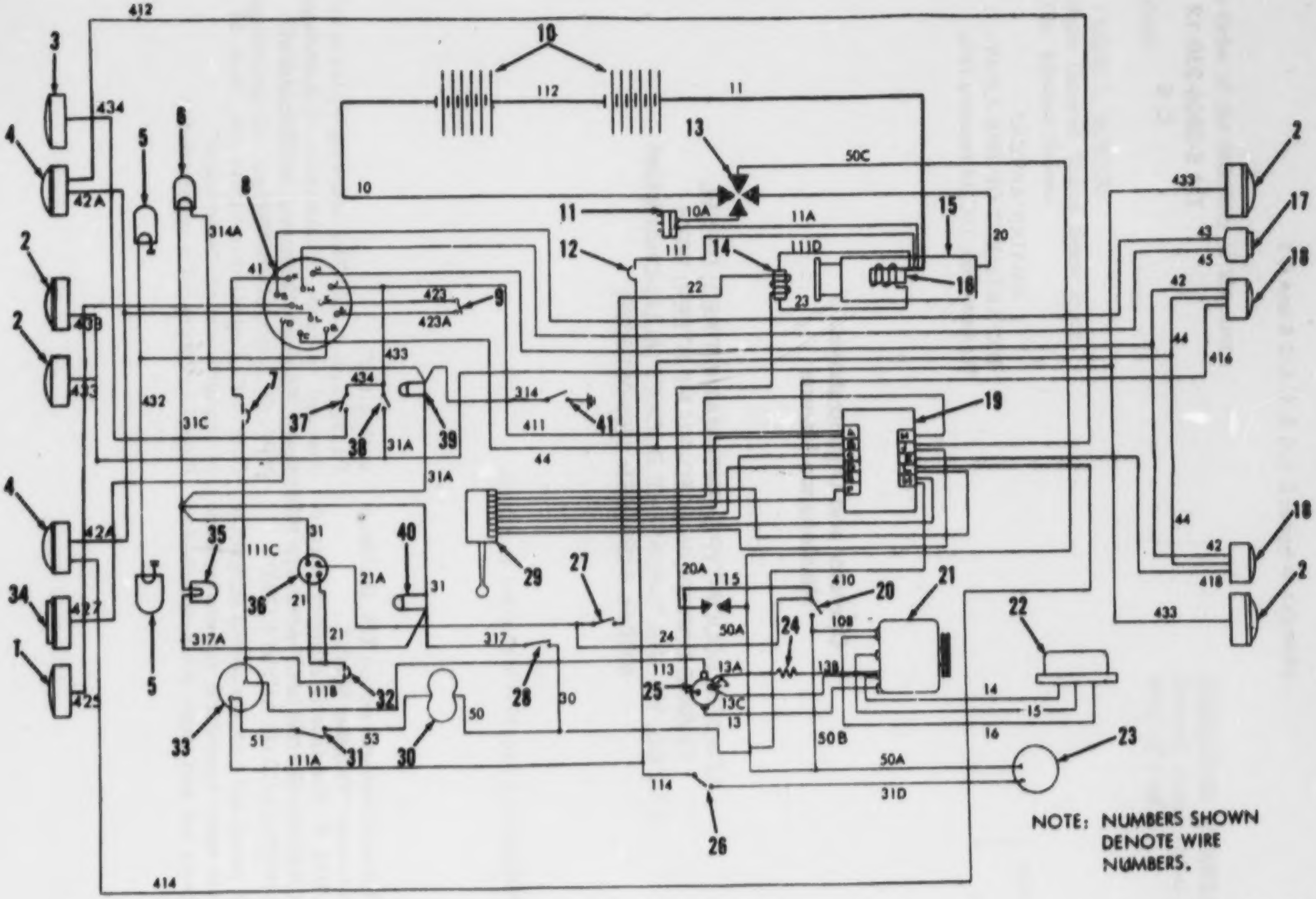
APPENDIX B. The title is changed to read: "BASIC ISSUE ITEMS LIST AND ITEMS TROOP INSTALLED OR AUTHORIZED".

Page 1-2, paragraph 1-1.*b*, the second sentence is changed to read: "Appendix B contains the basic issue items list and items troop installed or authorized".

Paragraph 1-1.d. The mailing address is changed to read: "Commander, U.S. Army Troop Support Command, ATTN: AMSTS-MPP, St. Louis, MO 63120".

Page 1-6. Legend for figure 1-3, item 21 is changed to read: "Alternator".

Page 1-7. Figure 1-3 is superseded:



NOTE: NUMBERS SHOWN DENOTE WIRE NUMBERS.

ME 3805-239-12/1-3, C6

Figure 1-3. Schematic wiring diagram

Page 2-10. The procedure, step 4 of Figure 2-5, is superseded as follows:

STEP 4. RELEASE ACCELERATOR AND ALLOW ENGINE TO OPERATE AT FAST IDLE (700-TO 1000-RPM) THREE OR FOUR MINUTES GRADUALLY COOLING THE ENGINE AND TRANSMISSION; THEN OPERATE ENGINE AT SLOW IDLE (650-TO 700-RPM) FOR 15 SECONDS ALLOWING THE TURBOCHARGER TO SLOW DOWN BEFORE THE ENGINE IS STOPPED, CUTTING OFF THE OIL FLOW.

Paragraph 2-12.b, the second sentence is superseded as follows: Allow engine to run at low idle (650-to 700-RPM) for 15 seconds, then increase the speed to fast idle (700-to 1000-RPM) for 3-to 5-minutes.

Page 3-1. Paragraph 3-1 is superseded as follows:

3.1. Special tools and Equipment

Special tools and equipment required by organizational maintenance personnel for maintenance of the loader are listed in section 111 of Appendix C.

Page 3-16. Paragraph 3-26. The title is changed to read: Alternator Not Charging".

Paragraph 3-26. Add line 5 to read as follows:

Alternator test ....Refer to (para 3-101.1)

Page 3-39. Figure 3-34, the title is changed to read: "Fan and alternator drive belts."

Page 3-51. Paragraph 3-78.*a*. Sentence 5 is changed to read: Hydraulic brake fluid in the hydraulic cylinder of the power cluster is forced out under pressure to the wheel cylinders.

Page 3-53. Paragraph 3-78.*e*, line 3 the second and third sentences are changed to read: "A safety valve, mounted outside the wet compartment, opens if the air pressure in the tank exceeds 170-to 180-PSI.

Page 3-69. Paragraph 3-90.*d* is added:

d. Test (Steering).

(1) Install a hydraulic tester (FSN 4910-868-6871) in series. With the hydraulic oil at operating temperature and engine operating at fast idle (2375 RPM), the rate of flow is 12 GPM, temperature 180 F, and the pressure 1825 ± 75 PSI (Refer to fig. 3-62.1).

Paragraph 3-91.d is added:

d. Test (Main System). For testing the main hydraulic systems, the following table gives the location, pressure, and flow where applicable for testing, using the hydraulic tester, fig. 3-62.2. (Refer to Appendix C, Section III for correct tester).

a. Rate of Flow: @ 1200 RPM - 1000 PSI, 39 GPM

b. Main Pump Capacity: @ 2200 RPM......70 GPM

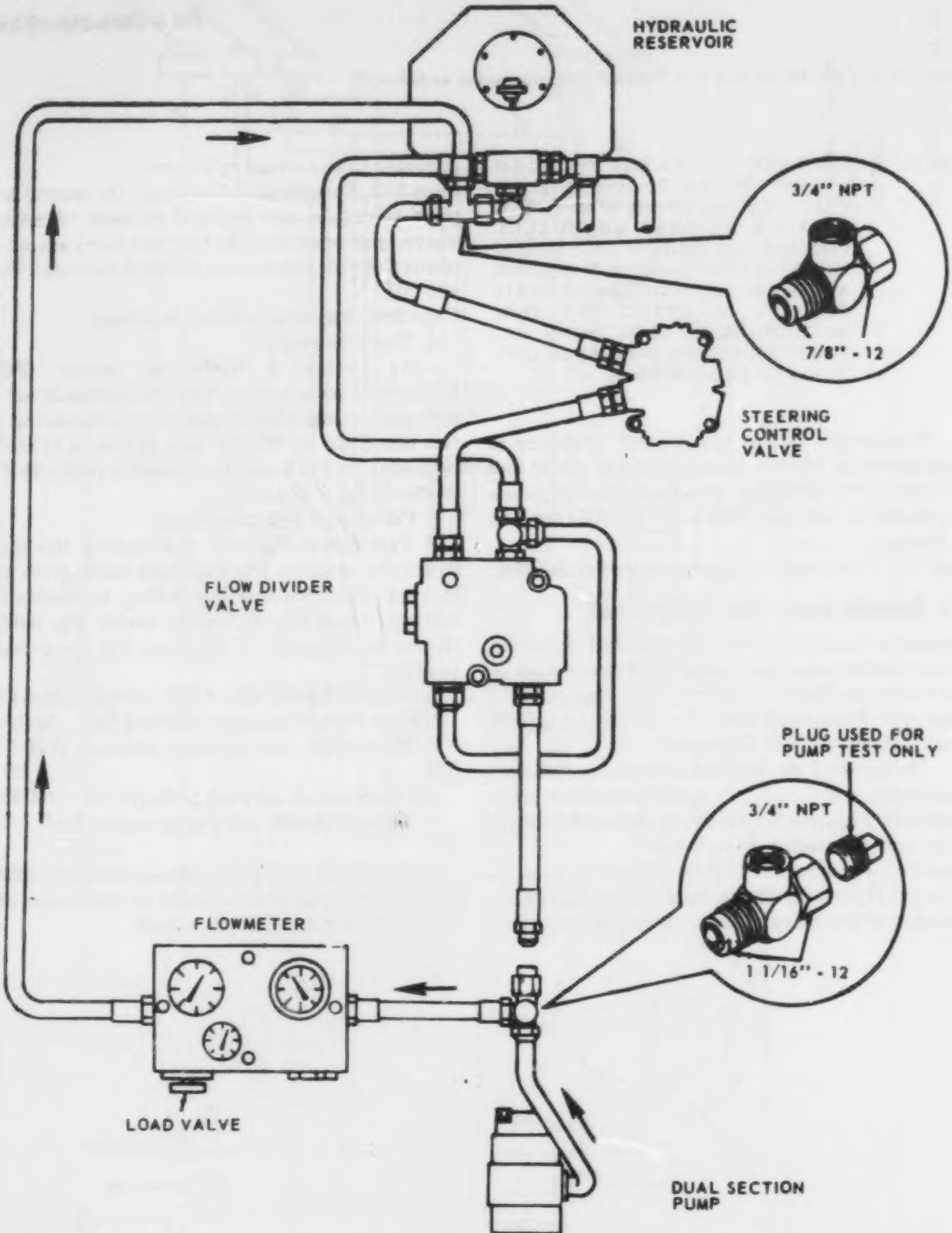
c. Main relief valve opening pressure 1825 ± 75 PSI

d. Dump circuit opening pressure 850 ± 100 PSI

e. Retract circuit opening pressure 2400 ± 100 PSI

f. Bucket lift time (high idle and empty) @ 2375 RPM, 6.5 seconds from ground to maximum lift.

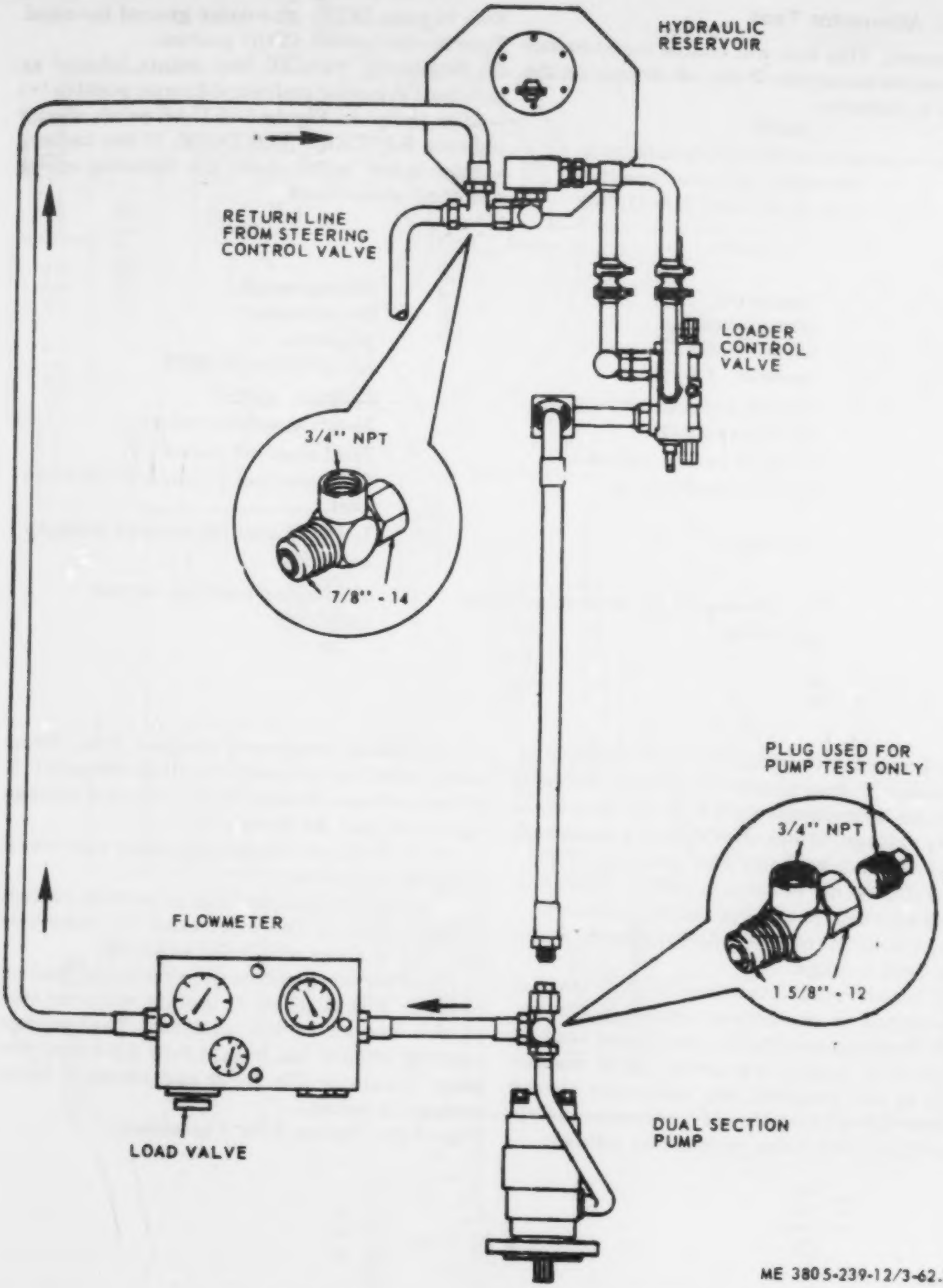
Page 3-69. Figure 3-62.1 is added:



ME 3805-239-12/3-62.1 C6

Figure 3-62.1 Steering hydraulic test, schematic view (sheet 1 of 1)

Page 3-69. Figure 3-62.2 is added.



ME 3805-239-12/3-62.2 C6

Figure 3-62.2 Main hydraulic systems test, schematic view (sheet 2 of 2)

Page 3-84. **Paragraph 3-101.1 is added:**

3-101.1 Alternator Test

a. General. This test will enable maintenance personnel to determine if the alternator or the voltage is defective.

NOTE

Make certain that the vehicle battery is properly installed, and the specific gravity should be at least 75% (1.240) full charge.

(1) Connect negative (−) lead of test voltmeter (0-to 50-volts DC) to alternator ground terminal. Turn master switch to ON position.

(2) Beginning with all test points labeled as number 1 (5 points) position voltmeter positive (+) lead as shown in Figure 3-75.1. All points should indicate BATTERY VOLTAGE. If the battery voltage is not noted, check the following cables and their connections.

Cable No.	From	To
11	Positive (+)	Starter solenoid
111	Starter solenoid	Circuit breaker
111-A	Circuit breaker	Ammeter
111-B	Ammeter	Circuit breaker 3052135
21	Circuit breaker (#3052135)	Ignition switch
21-A	Ignition switch	Neutral safety switch
24	Neutral safety switch	Fuel shut-off valve
115	Fuel shut-off valve	D-1 terminal on reverse polarity unit
113	Ammeter	L-2 terminal on reverse polarity solenoid
13	L-1 terminal on reverse polarity solenoid	Alternator positive output terminal

(3) Position the positive (+) voltmeter lead on number 2 test points (2 points), voltage should be approximately 0.8 to 1.0 less than battery voltage. Check the following leads and their connections if voltmeter reading differs.

(a) Diode on reverse polarity protector may be shorted, providing battery voltage.

(b) Diode on reverse polarity may be open, giving zero voltage.

(c) Lead from D-2 terminal may be loose at D-2 terminal or on reverse polarity solenoid.

(4) Position positive (+) voltmeter lead on number 3 (1 point) test point. With master switch in ON position, the voltmeter should indicate 9.0 ±1.0 volts. If voltmeter reads higher than 10.0 volts, proceed as follows:

(a) Place temporary jumper from alternator auxiliary terminal to field terminal. If correct voltage is noted (9.0 ± 1.0 volts) voltage regulator may be defective.

(b) Replace voltage regulator and retest without the jumper.

(c) If the jumper fails to provide correct voltage, remove the alternator for examination of slip rings and rotor winding.

(5) Position positive (+) voltmeter lead on number 4 test point (1 point) with master switch turned to ON position. The voltage reading should be from 4.0-to 6.0-volts. Replace regulator (fig. 3-79) and retest if lower voltage is noted.

Page 3-86. Figure 3-75. 1 is added.

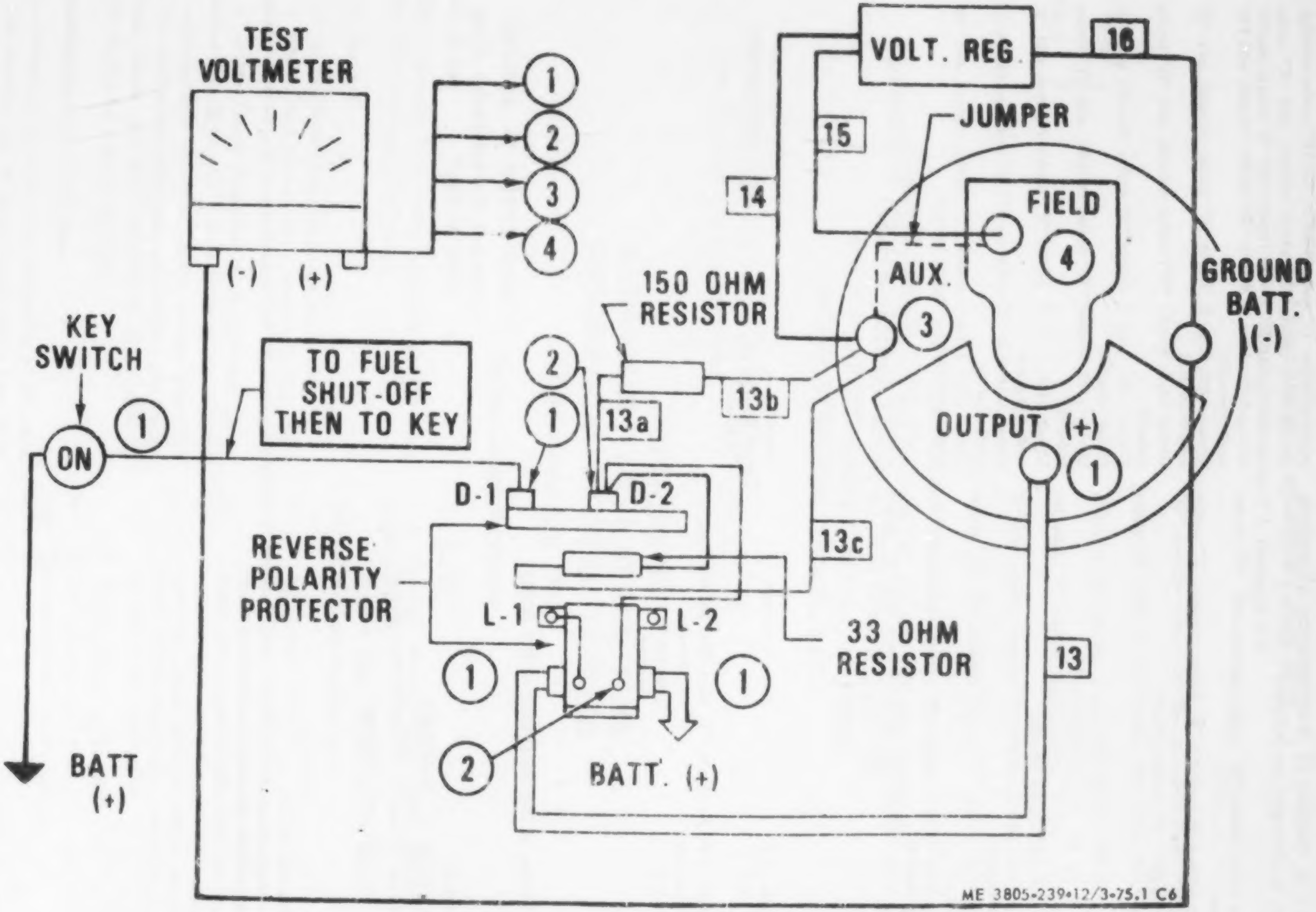


Figure 3-75.1 Alternator test connections, schematic view

Page C-3. Section II Maintenance Allocation Chart is changed as follows:

Group 0100. Delete "D" under replace, add "H" under replace.

Group 0101. Line 1, delete "D" under replace, "D" under repair, "D" under rebuild, add "H" under replace, "H" under repair, "H" under rebuild.

Group 0102. Delete "D" under rebuild; add "H" under rebuild.

Group 105. Line 6, delete "F" under adjust; add "0" under adjust.

Group 0301. Add "F" under adjust, delete "D" under rebuild, add "H" under rebuild.

Group 0306. Line 3, delete "F" under replace, add "0" under replace.

Group 0708. Delete "D" under rebuild, add "H" under rebuild.

Group 0710. Line 3, delete "D" under rebuild, and "H" under rebuild.

Group 0713. Delete "D" under replace, add "H" under replace, delete "D" under rebuild, add "H" under rebuild.

Group 0719. Delete "D" under replace, add "H" under replace, delete "D" under repair, add "H" under repair.

Group 0721. Line 3, delete "D" under rebuild, add "H" under rebuild.

Group 1000. Line 2, delete "D" under rebuild, add "H" under rebuild.

Group 1002. Delete "D" under rebuild, add "H" under rebuild.

Group 1100. Line 2, delete "D" under rebuild, add "H" under rebuild.

Group 1102. Delete "D" under rebuild, add "H" under rebuild.

Group 1208. Line 3, delete "F" under replace, add "0" under replace.

Group 1410. Add "0" under test, "1-B" under col (4), "A-A" under col (5).

Group 1501. Line 1, delete "D" under replace, add "H" under replace.

Page C-8. Section III, add the following:

Reference code	*Maintenance category*	*Nomenclature*	*Tool number*
1-A	0	Tester Hydraulic Circuit	4910-868-6871

Page C-8, Section IV, add the following:

Reference code	*Remarks*
A-A	Used for hydraulic testing.

By Order of the Secretary of the Army:

CREIGHTON W. ABRAMS
General, United States Army
Chief of Staff

Official:
VERNE L. BOWERS
Major General, United States Army
The Adjutant General

Distribution:

To be distributed in accordance with DA Form 12-25B (qty rqr block No. 402) Organizational Maintenance requirements for Earth Moving Equipment: Loaders.

GPO 905-468

This change is effective 1 July 1973
Changes in force C 1, through C 5

TM 5-3805-239-12
C 5

Change No. 5

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, D.C. *9 May 1972*

Operator and Organizational Maintenance Manual LOADER, SCOOP-TYPE; PNEUMATIC TIRED; DIESEL ENGINE DRIVEN; HINGED-FRAME STEER; WITH 2½ CU. YD. MULTI-PURPOSE BUCKET (ALLIS-CHALMERS MODEL 645M) FSN 3805-051-9359

TM 5-3805-239-12, 5 July 1968, is changed as follows:
Page B-1. Appendix B is superseded.

APPENDIX B
BASIC ISSUE ITEMS LIST AND ITEMS TROOP INSTALLED OR AUTHORIZED

(Effective 1 July 1973)

Section I. INTRODUCTION

B-1. Scope

This appendix lists items required by the operator for operation of the loader.

B-2. General

This list is divided into the following sections:

a. Basic Issue Items List—Section II. Not applicable.

b. Items Troop Installed or Authorized List—Section III. (Effective 1 July 1973) A list of items in alphabetical sequence, which at the discretion of the unit commander may accompany the loader. These items are NOT SUBJECT TO TURN IN with the loader when evacuated.

B-3. Explanation of Columns

The following provides an explanation of columns in the tabular list of Basic Issue Items List, Section II and Items Troop Installed or Authorized, Section III.

a. Source, maintenance, and Recoverability Code(s) (SMR):

(1) *Source code,* indicates the source for the listed item. Source codes are:

Code	Explanation
P	Repair parts, special tools and test equipment supplied from GSA/DSA or Army supply system and authorized for use at indicated maintenance levels.
P2	Repair parts, special tools and test equipment which are procured and stocked for insurance purposes because the combat or military essentiality of of the end item dictates that a minimum quantity be available in the supply system.

(2) *Maintenance code,* indicates the lowest level of maintenance authorized to install the listed item. The maintenance level code is:

Code	Explanation
C	Crew/Operator

(3) *Recoverability code,* indicates whether

unserviceable items should be returned for recovery or salvage. Items not coded are nonrecoverable. Recoverability codes are:

Code	Explanation
R	Applied to repair parts (assemblies and components), special tools and test equipment which are considered economically reparable at direct and general support maintenance levels.
S	Repair parts, special tools, test equipment and assemblies which are economically reparable at DSU and GSU activities and which normally are furnished by supply on an exchange basis.

b. Federal Stock Number. This column indicates the Federal stock number assigned to the item and will be used for requisitioning purposes.

c. Description. This column indicates the Federal item name and any additional description of the item required.

d. Unit of Measure (U/M). A 2 character alphabetic abbreviation indicating the amount or quantity of the item upon which the allowances are based, e.g., ft, ea, pr, etc.

e. Quantity Furnished with Equipment (BIIL). (Not applicable).

f. Quantity Authorized (Items Troop Installed or Authorized). This column indicates the quantity of the item authorized to be used with the equipment.

SECTION III. ITEMS TROOP INSTALLED OR AUTHORIZED LIST

(Effective 1 July 1973)

SMR CODE	FEDERAL STOCK NUMBER	DESCRIPTION	UNIT OF MEAS	QTY AUTH
	7520-559-9618	CASE, Maintenance and Operations manuals	EA	1
	4210-889-2221	EXTINGUISHER: Fire	EA	1

By Order of the Secretary of the Army:

W. C. WESTMORELAND,
General, United States Army,
Chief of Staff.

Official:

VERNE L. BOWERS,
Major General, United States Army,
The Adjutant General.

Distribution:

To be distributed in accordance with DA Form 12-25B (qty rqr block No. 402) organizational maintenance requirements for Loaders.

Changes in force: C1, C2, C3, C4

TM 5-3805-239-12
C4

CHANGE No. 4

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 5 *October 1970*

Operator and Organizational Maintenance Manual

LOADER SCOOP TYPE, PNEU-TIRED, DIESEL ENGINE DRIVEN, HINGED FRAME STEER, WITH 2½ CU YD MULTI-PURPOSE BUCKET

(ALLIS CHALMERS MODEL 645M)
FSN 3805-051-9359

TM 5-3805-239-12, 5 July 1968, is changed as follows:

Cover and title page nomenclature is changed to agree with above.

Page 1-1. Paragraph 1-1 is superseded as follows:

1-1. Scope

a. General. These instructions are published for use of personnel to whom the articulated scoop type loader (figs. 1-1 and 1-2) is issued. They provide information on the operation and organizational maintenance of the equipment. Includede are descriptions of main units and their function in relationship to other components.

b. Illustrations. When numbers appear in parentheses following nomenclature callouts on illustrations, it indicates quantity required. Numbers preceding callouts indicate the recommended maintenance sequence.

c. Administrative Storage. Instructions governing administrative storage of equipment appear in TM 740-90-1.

d. Destruction of Army Materiel to Prevent Enemy Use. Procedures for destruction of equipment to prevent enemy use are contained in TH 750-244-3.

Page 1-7. Figure 1-3 is superseded as follows:

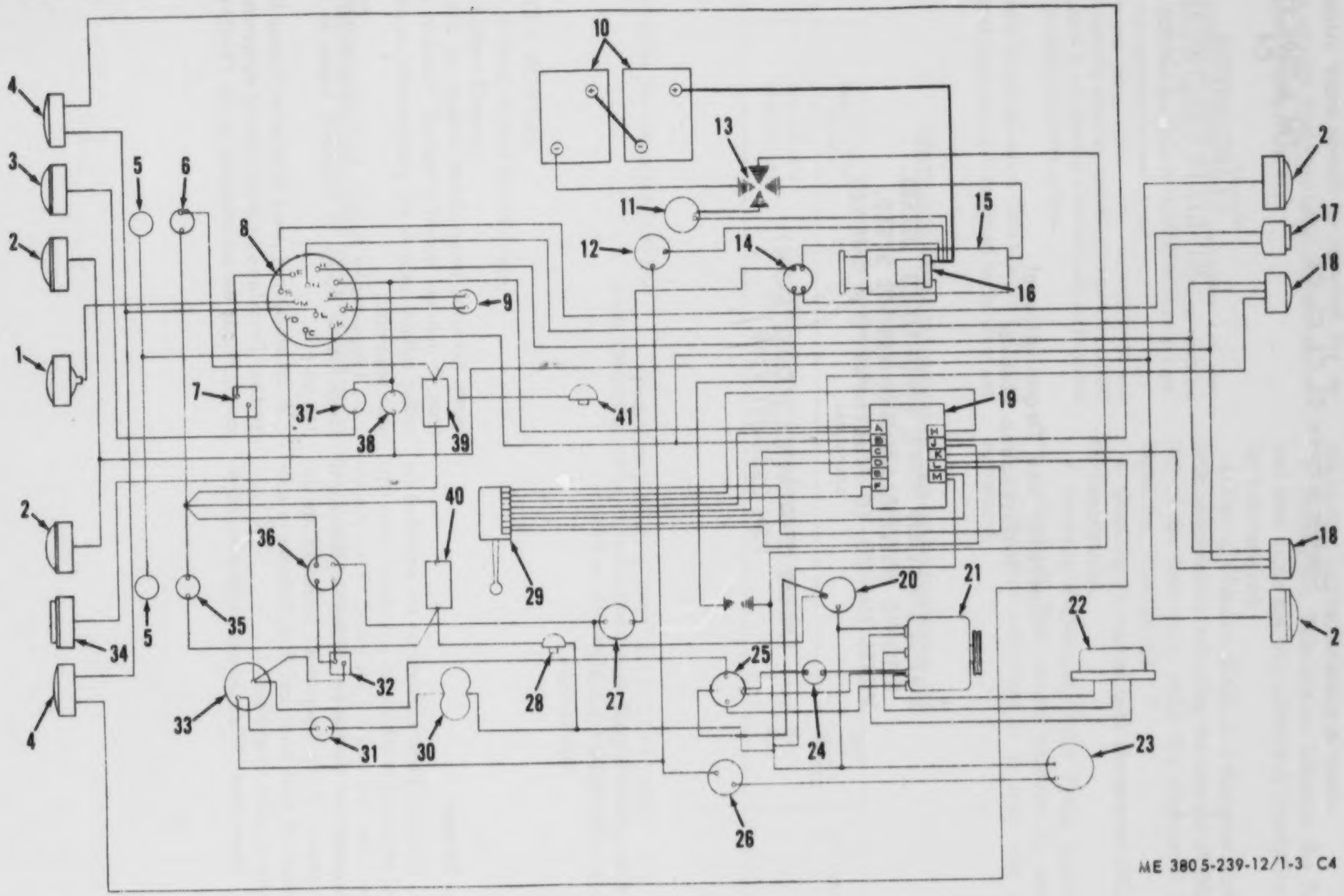


Figure 1-3. Schematic wiring diagram.

Page 2-1. Paragraph 2-3*d* is superseded as follows:

d. Lubricate the loader as prescribed by LO 5-3805-239-12-1 or -2 and paragraph 3-4.

Page 2-2. Paragraph 2-3*f*, in line 4, change "(para 3-4)" to read "LO 5-3805-239-12-1 or -2".

Page 2-3. Paragraph 2-5. In line 1, change "bar, refer to figure" to read "bar. refer to figure"

Page 2-19. Paragraph 2-15*e*. In line 2, change "order." to read "order LO 5-3805-239-12-1 or -2 and paragraph 3-4".

Page 2-20. Paragraph 2-16*e*. In line 2, change "order (para 3-4)." to read "order LO 5-3805-239-12-1 or -2 and paragraph 3-4".

Page 2-21. Paragraphs 2-17*e* and 2-19*b*(4). In line 2, chnage "order (para 3-4)." to read "order LO 5-3805-239-12-1 or -2 and paragraph 3-4).".

Page 3-1. Paragraph 3-3 is superseded as follows:

3-3. General Lubrication Information

This section contains lubrication instructions which are supplemental to, and not specifically covered in lubrimation order LO 5-3805-239-12-1 and -2.

Page 3-1. Figure 3-1. Not Used.

After paragraph 3-4*c*, add subparagraph *c*.1 as follows:

c.1. *OES Oil*.

(1) When using OES oil, the crankcase oil level must be checked more frequently, as oil consumption may increase.

(2) OES oil may require changing more frequently because of contamination by dilution or sludge formation, which increases under cold weather operating conditions.

Page 3-13. On figures 3-11, change "GENERATOR" to read "ALTERNATOR" in 6 places.

Paragraph 3-11*a*(1) is superseded as follows:

(1) The fan belt matched set drives the engine cooling fan and battery charging alternator by power derived from the crankshaft pulley. The alternator is moveable on its mounting bracket for belt adjustment.

Page 3-15. Paragraph 3-16. The possible remedy for the 3rd possible cause, change "Report this condition to direct support maintenance" to read "Replace fuel injector nozzle (para 3-45)".

Paragraph 3-20. Remedy for 5th probable cause, change "Check cylinders and nozzles (para 3-45). Report ***** Maintenance" to read "Check fuel injector nozzles of cylinders (para 3-45). Replace a defective nozzle. If no improvement in operation, report condition to direct support maintenance".

Page 3-16. Paragraph 3-21. Remedy to 3rd probable cause. Change "Check cylinders and nozzles (para 3-45)." to read "Check fuel injector nozzles of cylinders (para 3-45). If no improvement in operation, report condition to direct support maintenance.".

Paragraph 3-21. 4th probable cause and possible remedy is rescinded.

Paragraph 3-25. In 3rd probable cause and possible remedy. Change "Generator" to read "Alternator" (2 places).

Paragraph 3-28. Possible remedy to 3rd probable cause. Change "Report this condition to direct support maintenance." to read "Replace (para 3-54).".

Page 3-17. Paragraph 3-29. Possible remedy to 3rd probable cause. Change "Report this condition to direct support maintenance." to read "Replace (para 3-55)."

Paragraph 3-31. Possible remedy to 4th probable cause. Change "(para 3-4)." to read "(LO 5-3805-239-12).".

Paragraph 3-32. In possible remedy to 6th probable cause, change "Replace cntrol valve (para 3-92)." to read "Refer this condition to direct support maintenance.". In 7th probable cause and possible remedy, change "steering gear assembly" to read "steering tie rod" (2 places).

Page 3-17. Paragraph 3-33. In possible remedy to 5th probable cause, change "Replace control valve (para 3-92)." to read "refer this condition to direct support maintenance.". In possible remedy to 7th probable cause, change" (para 3-91)." to read "(para 3-94).".

Paragraph 3-34. In possible remedy to 1st probable cause, change "proper level." to read "proper level (LO-5-3805-239-12).".

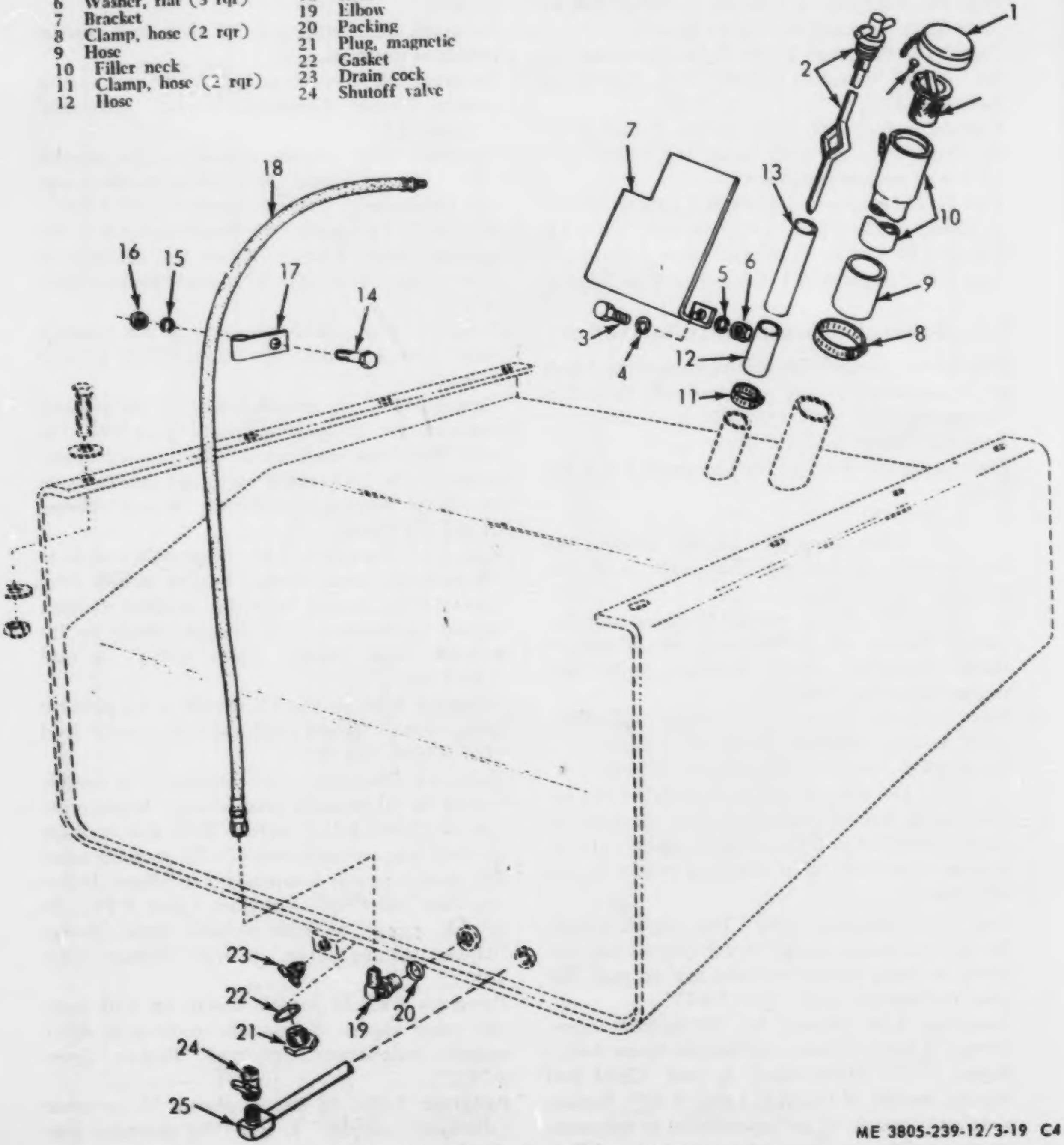
Page 3-18. Paragraph 3-34 (continued). In possible remedy for 4th probable cause, change "Replace control valve (para 3-92)." to read "Refer this condition to direct support maintenance.". 7th probable cause and possible reemdy is superseded as follows: Defective clam relief valve—Replace (para 3-94). In possible remedy to 10th probable cause, change "Replace steering pump." to read "Replace (para 3-90).".

Paragraph 3-35. In possible remedy for 12th probable cause, change "Report this condition to direct support maintenance." to read "Replace (para 3-79).".

Paragraph 3-39*a*. In line 3, change "A generator (alternator) supplies" to read "An alternator supplies."

Page 3-25. Figure 3-19 is superseded as follows:

1	Filler cap
2	Fuel gage
3	Capscrew (3 rqr)
4	Nut (3 rqr)
5	Washer, lock (3 rqr)
6	Washer, flat (3 rqr)
7	Bracket
8	Clamp, hose (2 rqr)
9	Hose
10	Filler neck
11	Clamp, hose (2 rqr)
12	Hose
13	Tube
14	Capscrew
15	Washer, lock
16	Nut
17	Clamp
18	Hose
19	Elbow
20	Packing
21	Plug, magnetic
22	Gasket
23	Drain cock
24	Shutoff valve
25	Tube, outlet
26	Screw
27	Screen, inlet



ME 3805-239-12/3-19 C4

Figure 3-19. Fuel tank linesand fittings, removal and installation.

Paragraph 3-39*b*. In line 5, change "the generator (alternator) as" to read "the alternator as".

Paragraph 3-40. In line 2, change "generator' to read "alternator".

Page 3-19. On label at top of figure 3-13, change "GENERATOR" to read "ALTERNATOR". Title of figure 3-13 is superseded as follows:

Figure 3-13. *Alternator wire connections.*

Page 3-23. After paragraph 3-45*c*, add subparagraph *d* as follows:

d. Fuel Injector Nozzles. Refer to figure 3-18, disconnect fuel lines from fuel injector nozzles, then remove fuel injectors. Install in reverse order.

Paragraph 3-46 is superseded as follows:

3-46. Fuel Tank Lines and Fittings

a. General. The fuel tank is mounted at rear of the loader, beneath the radiator. The filler pipe extends through the radiator grille for access in filling tank.

b. Line or Fitting Removal and Installation.

(1) Refer to figure 3-15 and remove radiator grille.

(2) Drain fuel from tank into a suitable clean container.

(3) Refer to figure 3-19 and remove line or fitting as required.

(4) Install in reverse order of removal.

Page 3-33. Paragraph 3-59 is rescinded.

Page 3-34. Paragraph 3-60 is rescinded.

Page 3-35. Figure 3-30 is rescinded.

Page 3-36. Figure 3-31 is rescinded.

Page 3-37. Paragraph 3-63*b*(2) and *c*(2). In line 1, change "paragraph 3-42" to read "figure 3-15" (2 places).

So much of paragraph 3-64 as reads "generator" is changed to read "alternator" (6 places).

Page 3-40. Paragraph 3-66*c* is superseded as follows:

c. Installation. Install by reversing the removal procedure in *b* above.

NOTE

At installation tighten screws (19, 20, 13, 14, 15, and 2, fig. 3-35) to a torque of between 28 and 33 foot—pounds.

Page 3-43. Paragraph 3-69, add subparagraph *e* after *d* as follows:

e. Neutral Starting Switch and Mounting Bracket.

(1) *Removal.*

(a) Tag and disconnect electrical leads.

(b) Remove nut (16, fig. 3-38) then lift switch (19) off washer (17) and mounting bracket (23). Do not remove nut (18) from switch unless switch is to be replaced.

(c) When required, remove four nuts (20), washers (21), two U-bolts (22), and mounting bracket (23) from column of steering gear.

(2) *Installation.* Install neutral starting switch and mounting bracket by reversing the removal procedure used in (1) above.

Page 3-43. Paragraph 3-70*b*(2)(i). In line 2, change "(refer to Lubrication Order, para 3-4)." to read "(LO 5-3805-239-12).".

Page 3-47. Paragraph 3-71*c*(2). In line 1, change "paragraph 3-70" to read "LO 5-3805-239-12".

Paragraph 3-72*c*(1) and *d*(2). In line 1, change "paragraph 3-71" to read "figure 3-40" (2 places).

Section XIV, with paragraphs 3-73 and 3-74, is superseded as follows:

Section XIV. PROPELLER SHAFTS

3-73. General

a. The loader motive power is furnished by propeller shafts leading from the transmission to the axle differentials. The rear axle propeller shaft is coupled directly from differential to transmission. The center propeller shaft is coupled from transmission to cross of front axle propeller shaft which extends through center bearing support. The front axle propeller shaft then is coupled to the front axle differential.

b. The propeller shafts are connected through universal joints (cross) which allows the loader to pivot. The center propeller shaft has a spring loaded ball type splined shaft enclosed in a tube which telescopes in or out during turning action of the loader.

3-74. Propeller Shafts

a. Removal.

(1) Block all wheels to prevent accidental movement of the loader.

(2) Install safety locking bar (fig. 3-42) to prevent articulation.

Note. Install locking bar in center hole of rear bracket (loader ends in line) except when workroom is required.

(3) Clean cross asemblies and spline areas before removal.

(4) Refer to figure 3-43 and remove the required propeller shaft or cross assembly.

b. Installation.

(1) Install by reversing the removal procedure used in *a* above.

(2) Lubricate all propeller shafts in accordance with LO 5-3805-239-12.

Paragraph 3-75*c* and *d* are superseded as follows:

c. Each wheel is amounted to wheel hub portion of the axle planetary drive, on 12 wheel stud shoulder bolts, and secured with 12 wheel stud nuts. These nuts must be frequently checked for security. At installation, and at other prescribed periods, tighten the nuts as described in paragraph 3-76c(1) and note

d. The front and rear axles are similar. They consist of a housing with a differential at the center. Differentials turn the axle shafts that actuate the planetary drive wheel hub at each end of the housing. Propeller shafts connected between the transmission and the differentials transmit engine power to the wheels and tires.

Page 3-50. Paragraph 3-76*a*(4) and (5) are superseded, and (6) through (8) are added as follows:

(4) Remove 12 nuts (6, fig. 3-44) and remove wheel and tire from loader.

(5) Remove core from valve (1) and allow all pressure to escape from tire.

(6) Position wheel and tire on floor with lock ring (2) side down. Force bead of tire loose from rim of wheel (7) at several places around the wheel, until the bead drops toward center of wheel.

(7) Turn wheel and tire over so that lock ring side is up, then repeat breaking of bead from flange (4) as in step (6) above.

WARNING

> Wrap and loosely tie a chain or rope around tire and wheel at two places 180° apart before prying lock ring (2) loose from flange (4), then stand aside while prying with a tire tool, to avoid injury should the lock ring spring out with force.

(8) After lock ring has been removed, remove chain or rope, then remove flange, (4) and packing (3) from wheel (7). Lift tire (5) from wheel (7).

Page 3-50. Paragraph 3-76*c* is superseded as follows:

c. Installation.

(1) Position wheel (7, fig. 3-44) on wood blocks with outer side up to receive tire (5) and flange (4). Be sure blocking is high enough to allow tire to seat on wheel.

(2) Coat flange and tire bead with a solution of soap flakes and water, or a rubber lubricant.

(3) Lower tire evenly on wheel.

(4) Lubricate packing groove in flange (4) and wheel (7).

(5) Position flange (4) squarely on wheel (7) and press down until flange clears packing groove.

CAUTION

> Do not reuse an old packing.

(6) Lubricate a new packing (3), then install the packing in its groove.

(7) Install lock ring (2).

WARNING

> Prior to inflation of tire, wrap a chain or cable securely around the assembly in a manner to keep parts from separating and injuring personnel should lock ring fail.

(8) Using an air hose with a remote valve and threaded fitting on end of gage line, thread hose onto valve stem and while standing well back from the assembly, inflate the tire to a pressure of 75 psi. At this pressure tire beads should snap into place on rims.

(9) While holding pressure at 75 psi, check rim area for leaks by use of clear, or soap water.

(10) When no leaks are present, remove air hose and allow pressure to escape, then install valve core.

(11) Inflate tire to a pressure of 45 psi.

(12) Install wheel and tire on lugs of planetary drive wheel hub and secure with 12 lug nuts. Tighten nuts to a torque of between 365-400 ft. lb.

NOTE

> After a wheel has been installed, recheck the torque after 10, 50, and 100 hours of operation. Check all wheel nuts for torque after 100 hours of operation.

Page 3-51. Paragraph 3-77*a*(2) is superseded as follows:

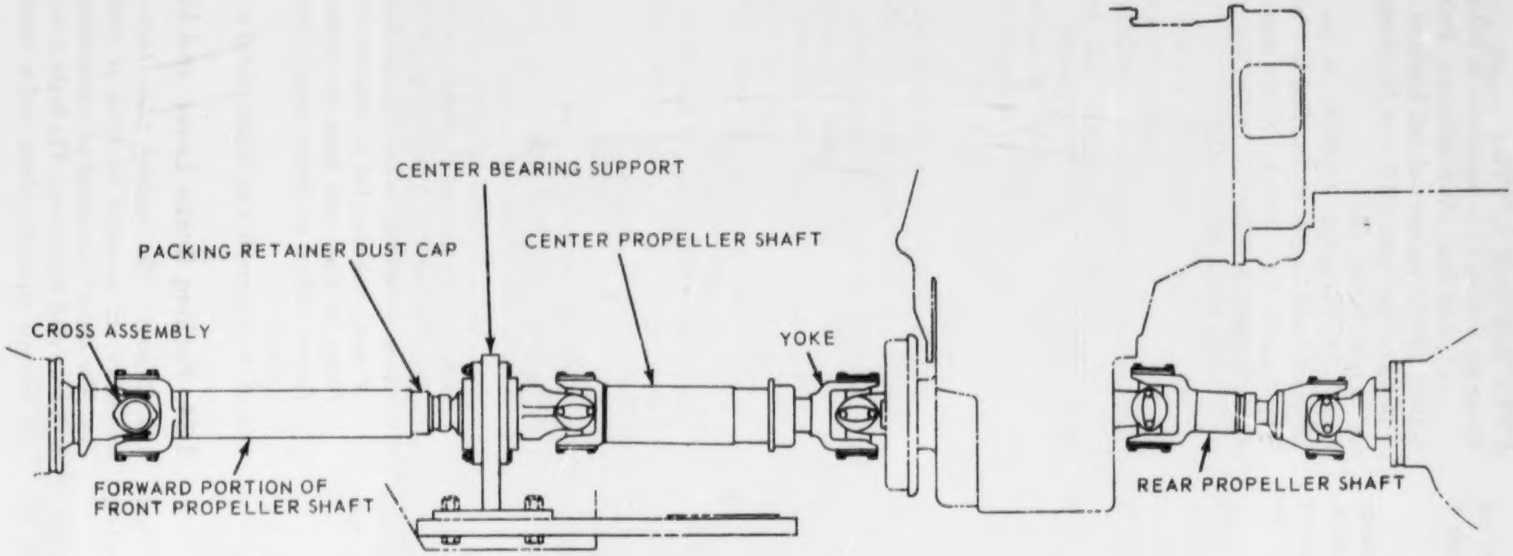
(2) Check oil level in planetary drives and differentials. Refer to LO 5-3805-239-12 for interval and lubricant

Page 3-54. After paragraph 3-79*b*(4), add subparagraph *c* as follows:

c. Adjusting the Governor.

(1) Start engine and observe air pressure indicator on instrument panel. The governor should unload the compressor when indicator reads between

Page 3-49. **Figure 3-43 is superseded as follows:**



STEP 1. DISCONNECT FORWARD PORTION OF FRONT PROPELLER SHAFT FROM YOKE ON FRONT AXLE DIFFERENTIAL.
STEP 2. UNSCREW PACKING RETAINER DUSTCAP FROM THREADS OF FRONT PROPELLER SHAFT TUBE YOKE, THEN SLIDE TUBE OFF SPLINES OF SHAFT IN CENTER BEARING SUPPORT.
STEP 3. DISCONNECT CENTER PROPELLER SHAFT AT YOKE IN CENTER BEARING SUPPORT, THEN AT YOKE ATTACHED TO PARKING BRAKE DRUM AT TRANSMISSION.
STEP 4. DISCONNECT REAR PROPELLER SHAFT AT YOKE OF TRANSMISSION, THEN AT YOKE OF REAR AXLE DIFFERENTIAL.

NOTE: PROPELLER SHAFTS ARE DISCONNECTED FROM YOKES BY REMOVAL OF FOUR SCREWS, TWO LOCKPLATES, AND TWO COVER PLATES. REMOVE CROSS ASSEMBLIES FROM YOKES OF PROPELLER SHAFT ENDS IN A SIMILAR MANNER.

ME 3805-239-12/3-43 C4

Figure 3-43. Propeller shaft, removal and installation.

103 and 107 psi.

(2) When unloading occurs below 103 psi, or above 107 psi, adjustment of the governor is necessary.

(3) Adjust the governor as follows:

(*a*) Remove the cover from top of governor.

(*b*) Loosen the locknut on adjusting screw, then turn the adjusting screw clockwise to increase the pressure, counterclockwise to reduce the pressure.

(*c*) Bleed off air by opening the drain cocks intermittently, and observe governor action. Allow pressure to build up, then recheck unloading pressure ((1) above). Repeat adjustment until the indicated pressure is within stated range.

(*d*) Tighten locknut on the adjusting screw, then install cover.

(*e*) Stop engine.

Page 3-54. Paragraph 3-81*b*(2) is superseded as follows:

(2) Refer to step 1 of figure 3-49 for service instructions.

Paragraph 3-81*d*(1) in line 2, change "injector" to read "evaporator".

Paragraph 3-81.1 is added after paragraph 3-81*d*-(3) as follows:

3-81.1. Brake Pedals and Air Application (Treadle) Valve

a. General. The right brake pedal and air application (treadle) valve is mounted on the platform, below the instrument panel. A rod connects the left pedal with the right, so that when the left pedal is depressed, braking action is the same as if the pedal attached to the valve was depressed.

b. Removal.

(1) Refer to figure 3-49.1 for disconnect points and removal instructions.

(2) Drain air pressure from the air reservoir.

(3) Plug openings in lines and valve to prevent contamination.

NOTE

> To separate air application valve from right brake pedal, remove two cotter pins from pin, then remove pin from engagement with valve flange and roller.

(4) Remove four nuts, lockwashers, and capscrews to separate brake pedals from connecting rod.

c. Installation. Install brake pedals, connecting rod, and air application valve by reversing the removal procedure in *b* above.

Paragraph 3-82*b*(3) is superseded as follows:

(3) Add fluid when necessary. Refer to LO 5-3805-239-12 for interval and lubricant.

In legend for figure 3-50, item 11, change "Adapter" to read "Screw, cap".

Page 3-58. Paragraph 3-83*b*(3) in line 3 after "adjusted." add "Adjust as described in *c* below.". Subparagraphs (4) through (8) are superseded by subparagraph *c* as follows:

c. Wheel Brake Adjustment.

(1) Release parking brake, position transmission shift level in neutral, then position blocks in front and back of wheels that are to be adjusted last.

(2) Position suitable jack under frame and lift wheels, to be adjusted, off the ground.

(3) Refer to figure 3-53 for method, then turn cam adjusting bolts alternatingly until both brake shoes are against the drum and prevent wheel from turning.

(4) Back off each cam adjusting bolt an equal amount, but just enough to move brake shoes away from drum and allow wheel to turn freely.

(5) Repeat steps (3) and (4) above for the remaining wheel on section being adjusted.

(6) Lower wheels to ground and remove jack.

(7) Repeat steps (1) through (16) above for the remaining section.

(8) After all four wheels have been adjusted, repeat piston travel check on stroke indicator of each power cluster (*b* above).

NOTE

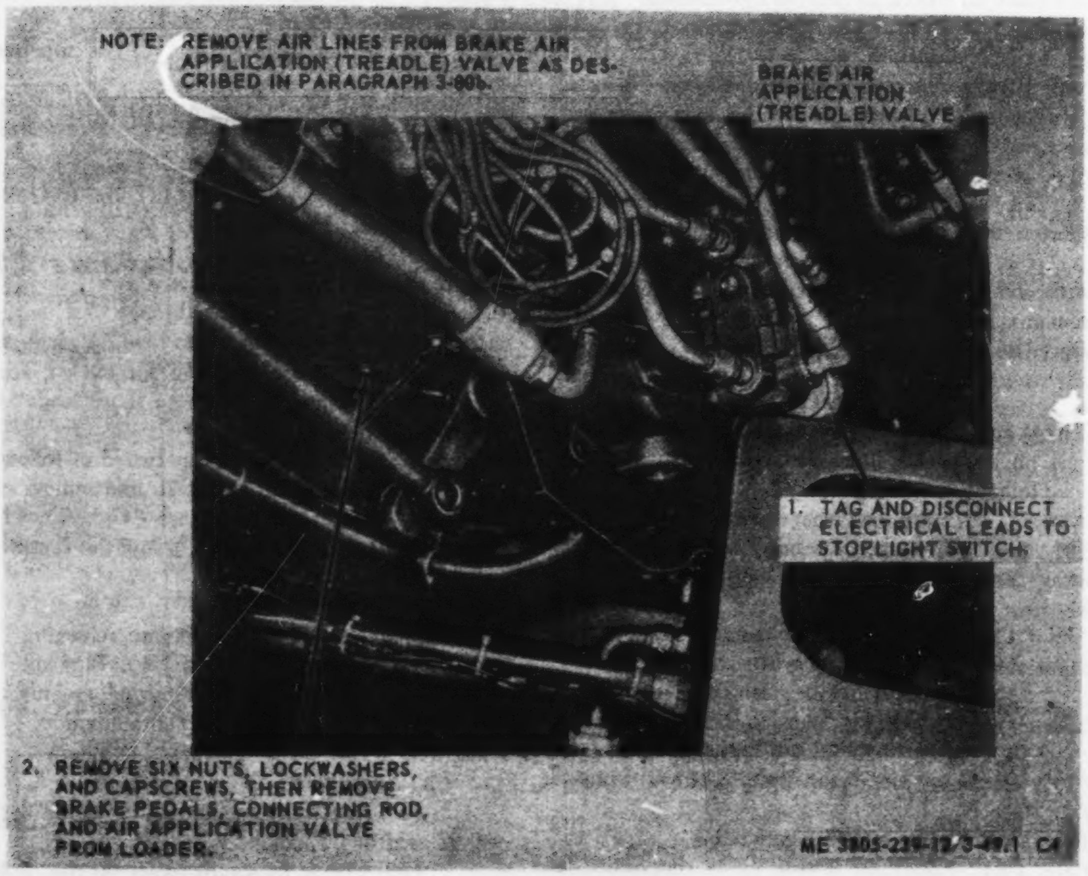
> When stroke indicator does not meet standard of 1.500 inch, wheel brakes must be readjusted. In cases of this nature, when backing off cam adjusting bolts, be sure that some scraping or dragging of lining against drum is heard while wheel is turning freely. Should repeat of stroke indicator fail to meet standard, lining is worn and must be replaced. Report defect to direct support maintenance.

Page 3-59. Paragraph 3-84 is superseded as follows:

3-84. Parking Brake Lever and Linkage

a. General. The parking brake backing plate and shoes are mounted on front of transmission case. The drum is mounted on transmission output shaft yoke with four screws. The brake is mechanical with internal expanding shoes, and is controlled by

Page 3-56. Figure 3-49.1 is added after 3-49 as follows:



NOTE: REMOVE AIR LINES FROM BRAKE AIR APPLICATION (TREADLE) VALVE AS DESCRIBED IN PARAGRAPH 3-80b.

BRAKE AIR APPLICATION (TREADLE) VALVE

1. TAG AND DISCONNECT ELECTRICAL LEADS TO STOPLIGHT SWITCH.

2. REMOVE SIX NUTS, LOCKWASHERS, AND CAPSCREWS, THEN REMOVE BRAKE PEDALS, CONNECTING ROD, AND AIR APPLICATION VALVE FROM LOADER.

ME 3805-239-12/3-49.1 C4

Figure 3-49.1. Brake pedals and air application valve, removal and installation.

linkage to a lever in the operator's compartment. The brake is applied by the operator lifting lever upward until it snaps over center. Purpose of the brake is to lock the transmission output against higher than average engine idle torque converter output, or to hold loader free of movement on inclined surfaces.

b. Parking Brake Linkage Removal.

(1) Position loader on a firm level surface and block all wheels to prevent movement.

(2) Refer to figure 3-54 and remove the parking brake linkage.

c. Parking Brake Linkage Installation. To install parking brake linkage, reverse the removal procedures used in *b* above.

d. Adjusting the Parking Brake.

(1) Turn knob (21, fig. 3-54) clockwise to shorten, counterclockwise to lengthen lever.

(2) Adjust so that lever, when lifted upward with about 30 lbs. of force snaps over center and remains in the applied position until forceably moved to release (down) position.

NOTE

When knob will not tighten enough to hold brake on, linkage may be adjusted as follows:

(3) Remove pins from rod end clevis (11 and 13), back jam nuts (10 and 12) on rod (14) away from clevis, then turn both clevis clockwise ½ turn.

(4) Lengthen lever by turning knob (21) counterclockwise as far as it will go.

(5) Reconnect rod end clevis and install pins. Shorten rod (20) in a similar manner.

(6) Apply, then release brake, turning knob (21) clockwise after each release, until adjusted ((2) above).

Page 3-61. Figure 3-55 is rescinded.

Page 3-64. Paragraph 3-86*b*(2) is superseded as follows:

(2) Refer to LO 5-3805-239-12 for interval and lubricant.

Page 3-66. Legend for figure 3-60. Item 5, change "Socket" to read "End". Item 7, change "Socket and tube" to read "Tie rod".

Page 3-69. Paragraph 3-90*c*(4). In line 4 change "Refer to paragraph 3-4." to read "Refer to LO 5-3805-239-12 for interval and lubricant.".

Page 3-71. Paragraph 3-92*b*(1)(f) is superseded as follows:

(f) Refer to figure 3-64 and install valve plate (6) and by-pass valve (5). Install new packing (4), filter cover (3), and washer(2). Tighten screws (1) to a torque of between 29-32 ft. lb.

Paragraph 3-92*b*(3)(*c*) is superseded as follows:

(*c*) Disconnect bail (19) from magnet and strainer cage (18). Remove baffle (20), outlet strainer (21), magnet (22), and packing (23) from cage.

Paragraph 3-92*b*(3)(*d*). In line 2, change "cover" to read "cover (12).".

Page 3-71. Paragraph 3-92*b*(3)(*f*) is superseded as follows:

(f) Install by reversing the removal procedure used in (a) through (d) above.

Paragraph 3-92*b*(4)(g). In line 2 and 3, change last sentence to read "Refer to LO 5-3805-239-12 for interval and lubricant.".

Page 3-79. Legend for figure 3-70, item 19, change "Safety valve" to read "Relief valve".

Paragraph 3-94*d*. In lines 4 through 7, change "A safety valve, **** position." to read "A clam relief valve, mounted in the center of the bucket, acts to protect the clam and bucket from shock loads while in the open position.".

Paragraph 3-94*d*(1)(*b*) is superseded as follows:

(*b*) Refer to figure 3-70 and remove clam cylinders (5) and (7), all hose (1), (6), (15), tubes (12), (13), (16), (17), and the clam relief valve (19).

NOTE

Support clam cylinders before removing the four connecting pins (4). Plug all hose or tubes as they are removed, and all cylinder ports to prevent contamination.

Paragraph 3-94*d*(2) is superseded as follows:

(2) *Installation.*

(*a*) Install by reversing the removal procedure used in (1) above.

(*b*) Check hydraulic reservoir for proper oil level (para 3-92*b*(4)).

(*c*) Start engine, operate bucket and clam, check for proper operation, then check clam cylinders, hose, and tubes for leaks.

Page 3-79. Legend to figure 3-70. Item 19, change "Safety valve" to read "Clam relief valve".

Page 3-80. Paragraph 3-96*d*(3). In line 2, change "(para 3-92)." to read "(para 3-92*b*(4))."

Page 3-83. So much of paragraphs 3-99 and 3-101 as reads "generator" is changed to read "alternator".

Pages 3-86, 3-87, *and* 3-88. Titles to figures 3-75, 3-76, and 3-77. Change "Generator" to read "Alternator".

Legend to figure 3-76. Item 14, change "Generator" to read "Alternator".

Page 3-91. Paragraph 3-104*b*(3). In line 2, change "(31)" to read "(3)".

Page 3-92. Figure 3-81. At left of image, add leader pointing to nut on starter terminal, with callout 10. In legend, add item 10 as follows: "10 Nut, starter terminal". Add title to figure 3-81 as follows:

Figure 3-81. Starter, removal and installation.

Page 3-95. Figure 3-84. At top of image, change callout "7" to read "3". At right of image, change callout "3" to read "7".

Page A-1. Appendix O is superseded as follows:

APPENDIX A
REFERENCES

A-1. Fire Protection

TB 5-4200-200-10	Hand Portable Fire Extinguishers for Army Users

A-2. Lubrication

C9100IL	
LO 5-3805-239-12-1	Fuels, Lubricants, Oils and Waxes
LO 5-3805-239-12-2	Lubrication Order, Loader Scoop Type, Pneu-Tired, Diesel Engine Driven, Hinged Frame Steer, With 2½ Cu Yd Multi-Purpose Bucket, (Allis Chalmers Model 645M) with Allis Chalmers Engine Model 3500

A-3. Painting

TM 9-213	Painting Instructions for Field Use

A-4. Radio Suppression

TM 11-483	Radio Interference Suppression

A-5. Maintenance

TM 9-1870-1	Care and Maintenance of Pneumatic Tires
TB 750-651	Use of Anti-freeze Solutions and Cleaning Compounds in Engine Cooling Systems
TM 38-750	The Army Maintenance Management System (TAMMS)

TM 9-6140-200-15	Operation and Organizational Field and Depot Maintenance Storage Batteries, Lead Acid Type
TB 700-4720-1	Hose Assembly Handbook —Cross Reference Data for Local Fabrication of Flexible Hose Assemblies. (DSAH 4185.1; NAVSUPPUB 5545, MCO P10440.1A)
TM 9-2858	Cooling Systems; Vehicles and Powered Ground Equipment

A-6. Shipment and Storage

TM 740-90-1	Administrative Storage of Equipment

Page B-4. Section III. MAINTENANCE AND OPERATING SUPPLIES is superseded as follows:
Page C-1. Appendix C is superseded as follows:

Section III. MAINTENANCE AND OPERATING SUPPLIES

(1) Component application	(2) Federal stock number	(3) Description	(4) Quantity required f/initial operation	(5) Quantity required F/8 hrs operation	(6) Notes
AXLE,DIFFERENTIAL, AND PLANETARIES	9150-242-7603 (2)	LUBRICATING OIL:	59 (8)		(1) Includes quantity to fill engine oil system, including oil filters. (2) See C9100IL for additional data amd requisitioning procedure. (3) Refer to LO 5-3805-239-12 for interval and grade. (4) Use DF-2 in temperatures above +32° F. Use DF-1 in temperatures from +32°F to 0°F. Use DF-A in temperatures from 0°F to −65°F. (5) Fuel consumption under normal load is 4.5 gal per hour of continuous operation. (6) Includes quantity to fill transmission oil system including hoses and filter. (7) Includes quantity of brake fluid for both front and rear brake cylinders. (8) Front differential 27 qt; rear differential 20 qt; ea planetary hub, 3 qt. (9) See Table 2-1 for quantities, ambient temperatures, specific gravity, and replenishment procedures
		OES, 5 gal pail			
BRAKE MASTER CYLINDER	9150-190-0932	HYDRAULIC FLUID:			
		HBA, 1 pint can	2 pt (7)	(3)	
CRANKCASE (1)		LUBRICATING OIL: 5 gal pail as follows:			
	9150-265-9435 (2)	OE-30	24 qt	(3)	
	9150-265-9428 (2)	OE-10	24 qt	(3)	
	9150-242-7603 (2)	OES	24 qt	(3)	
FUEL TANK		FUEL OIL, DIESEL: bulk as follows:			
	9140-286-5294	DF-2 (4)	59 gal	(5)	
	9140-286-5286	DF-1 (4)	59 gal	(5)	
	9140-286-5283	DF-A (4)	59 gal	(5)	
HYDRAULIC SYSTEM		LUBRICATING OIL: 5 gal pail as follows:			
	9150-265-9428	OE-10	54 gal	(3)	
	9150-242-7603	OES			
LUBRICATION FITTINGS	9150-190-0905 (2)	GREASE, AUTOMOTIVE AND ARTILLERY, 5 lb can as follows:			
		GAA	2 shots w/ grease gun	5 shots w/ grease gun	
RADIATOR		WATER OR ANTIFREEZE	42 qt (9)		
STEERING, GREAR		GREASE, AUTOMOTIVE AND ARTILLERY, 5 lb can as follows:			
	9150-190-0905 (2)	GAA	1½ lb	(3)	
TRANSMISSION AND TORQUE CONVERTER		LUBRICATING OIL: 5 gal pail as follows:			
	9150-265-9428 (2)	OE-10	31 qt (6)	(3)	
	9150-242-7603 (2)	OES	31 qt (6)	(3)	

APPENDIX C

MAINTENANCE ALLOCATION CHART

Section I. INTRODUCTION

C-1. General

a. This section provides a general explanation of all maintenance and repair functions authorized at various maintenance levels.

b. Section II designates overall responsibility for the performance of maintenance functions on the identified end item or component. The implementation of the maintenance functions upon the end item or component will be consistent with the assigned maintenance functions.

c. Section III. Not Applicable.

d. Section IV contains supplemental instructions, explanatory notes and/or illustrations required for a particular maintenance function.

C-2. Explanation of Columns in Section II

a. Group Number. Column 1. The functional group is a numerical group, set up on a functional basis. The applicable functional grouping indexes (obtained from TB 750-93-1, Functional Grouping Codes) are listed on the MAC in the appropriate numerical sequence. These indexes are normally set up in accordance with their function and proximity to each other

b. Functional Group. Column 2. This column contains a brief description of the components of each functional group.

c. Maintenance Functions. Column 3. This column lists the various maintenance functions (A through K) and indicates the lowest maintenance category authorized to perform these functions. The symbol designations for the various maintenance categories are as follows:

C—Operator or crew
O—Organizational maintenance
F—Direct support maintenance
H—General support maintenance
D—Depot maintenance

The maintenance functions are defined as follows:

A—INSPECT. To determine serviceability of an item by comparing its physical, mechanical, and electrical characteristics with established standards.

B—TEST. To vertify serviceability and to detect electrical or mechanical failure by use of test equipment.

C—SERVICE. To clean, to preserve, to charge, and to add fuel, lubricants, cooling agents, and air. If it is desired that elements, such as painting and lubricaing, be defined separately, they may be so listed.

D—ADJUST. To rectify to the extent necessary to bring into proper operating range.

E—ALIGN. To adjust specified variable elements of an item to bring to optimum performance.

F—CALIBRATE. To determine the corrections to be made in the readings of instruments or test equipment used in precise measurement. Consists of the comparison of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared with the certified standard.

G—INSTALL. To set up for use in an operational environment such as an emplacement, site, or vehicle.

H—REPLACE. To replace unserviceable items with serviceable like items.

I—REPAIR. Those maintenance operations necessary to restore an item to serviceable condition through correction of material damage or a specific failure. Repair may be accomplished at each category of maintenance.

J—OVERHAUL. Normally, the highest degree of maintenance performed by the Army in order to minimize time work in process is consistent with quality and economy of operation. It consists of that maintenance necessary to restore an item to completely serviceable condition as prescribed by maintenance standards in technical publications for each item of equipment. Overhaul normally does not return an item to like new, zero mileage, or zero hour condition.

K—REBUILD. The highest degree of materiel maintenance. It consists of restoring equipment as nearly as possible to new condition in accordance with original manufacturing standards. Rebuild is performed only when required by operational considerations or other paramount factors and then only at the depot maintenance category. Rebuild reduces to zero the hours or miles the equipment, or component thereof, has been in use.

L—SYMBOLS. The uppercase letter placed in the appropriate column indicates the lowest level at which that particular maintenance function is to be performed.

d. Tools and Equipment. Column 4. This column is provided for reference by code the special tools and test equipment, (Section III) required to perform the maintenance functions (Section II).

e. Remarks. Column 5. This column is provided for referencing by code the remarks (Section IV) pertinent to the maintenance functions.

C-3. Explanation of Columns in Section IV

a. Reference Code. This column consists of two letters separated by a dash, both of which are references to Section II. The first letter references column 5 and the second letter references a maintenance function, column 3, A through K.

b. Remarks. This column lists information pertinent to the maintenance function being performed, as indicated on the MAC, Section II.

Section IV. REMARKS

Reference code	Remarks
A-B	Test includes operation and compression.
B-K	Repair of crankshaft includes metalizing, aligning, and grinding.
C-I	Repair of seat inserts includes refacing.

Section II. MAINTENANCE ALLOCATION CHART

(1)	(2)	(3) Maintenance functions											(4)	(5)
		A	B	C	D	E	F	G	H	I	J	K		
Group No	Functions group	Inspect	Test	Service	Adjust	Align	Calibrate	Install	Replace	Repair	Overhaul	Rebuild	Tools and equipment	Remarks
01	**ENGINE**													
0100	Engine Assembly	O	F	O					F	F	H	D		A-B
0101	Block or Cylinder Head													
	Block								D	D		D		
	Cylinder Head								F	H		D		
0102	Crankshaft	H							D			D		B-K
0103	Flywheel Assembly													
	Flywheel								H	H				
	Housing	O							H	H				
0105	Valves, Camshaft and Timing System													
	Arm, rocker				O				F	F				
	Cover, cylinder head								O	F				
	Seat insert	F							H	F				C-I
	Valves, lifters	F							F					
0106	Engine Lubricating System													
	Breather			O					O					
	Cooler, oil								F	F				
	Filter, oil			O					O					
	Pan, oil								H	H				
	Pump, oil								H	H				
0108	Manifolds	O							O					
0109	Accessory Drive Mechanism													
	Accessory Drive	H							H					
	Pulley Drive	O							F					
03	**FUEL SYSTEM**													
0301	Fuel Injector		F						O	F		D		
0302	Fuel Pump								F			D		
0304	Air Cleaner			O					O	O				
0305	Turbo Charger													
	Clamps and hose	O							O					
	Turbo charger								O			H		
0306	Tanks, Lines, Fittings													
	Lines and fittings	O							O					
	Tank, fuel	O		O					F	F				
0309	Fuel Filters			O					O					
0311	Engine Starting Aids			O					O					
0312	Accelerator, Throttle Controls				O				O					
05	**COOLING SYSTEM**													
0501	Radiator													
	Grille								O	F				
	Radiator	C		O					O	H				
0503	Thermostat and Housing													
	Gaskets		O						O					
0504	Water Pump													
	Belt	C			O				O					
	Pump			O					O	F				
0505	Fan Assembly													
	Belt	C			O				O					
	Hub Assembly								F	F				
06	**ELECTRICAL SYSTEM**													
0601	Alternator													
	Alternator		O						O	F		H		
	Belt	C			O				O					
0602	Regulator, Voltage				O				O					
0603	Starting Motor													
	Brushes								F	F				
	Motor, starting		O						O	F		H		

(1)	(2)	(3) Maintenance functions											(4)	(5)
Group No.	Functions group	A Inspect	B Test	C Service	D Adjust	E Align	F Calibrate	G Install	H Replace	I Repair	J Overhaul	K Rebuild	Tools and equipment	Remarks
0607	Instrument Control Panel	C							O	O				
0608	Miscellaneous	O							O					
0609	Lamps	O							O					
0611	Horn	O							O					
0612	Batteries	C	O	O					O					
0613	Chassis Wiring Harness								F	O				
07	**TRANSMISSION**													
0705	Control Levers and Linkage				O				O					
0708	Torque Converter								F	H		D		
0710	Transmission Assembly													
	Breather			O					O					
	Transmission		F	O					F	H		D		
0713	Intermediate Clutch								D			D		
0719	Reduction and Transfer Gears								D	D				
0720	Accessory Drive								H	H				
0721	Coolers, Pumps													
	Filter element			O					O					
	Pump								H			D		
09	**PROPELLER SHAFTS**													
0900	Propeller Shafts			O					O	H				
10	**FRONT AXLE**													
1000	Front Axle Assembly													
	Axle, front	O		O					F	H		D		
	Breather			O					O					
1002	Differential			O					F	H		D		
1003	Planetary or Final Drive			O					F	F	H			
11	**REAR AXLE**													
1100	Rear Axle Assembly													
	Axle, rear			O					F	H		D		
	Breather			O					O					
1102	Differential			O					F	H		D		
1103	Planetary or Final Drive			O					F	F	H			
12	**BRAKES**													
1201	Hand Brakes													
	Brake, hand			O	O				F	F				
	Lever, Linkage			O	O				O					
1202	Service Brakes				O				F	F	H			
	Pedals and rod	O							O					
1204	Hydraulic Brake System													
	Cylinder, wheel								F		H			
	Power cluster			O					O	F	H			
1208	Air Brake System													
	Chamber								F		H			
	Reservoir			O					F					
	Valve, air application	O		O					O	F	H			
1209	Air Compressor Assembly													
	Compressor								O	F	H			
	Governor				O				O					
13	**WHEELS**													
1311	Wheel Assembly								O	O				
	Drums, brake								F	F				
1313	Tires	O		O					O	O				
14	**STEERING**													
1401	Steering Assembly													
	Drag link and tie rod			O					O					
	Steering Assembly	O		O	O				F	F				
1410	Hydraulic Steering Pump								O		H			
1412	Hydraulic Steering Cylinders								O		H			
1414	Steering System Valves								F		H			

(1)	(2)	(3)											(4)	(5)
		Maintenance functions												
		A	B	C	D	E	F	G	H	I	J	K		
Group No.	Functions group	Inspect	Test	Service	Adjust	Align	Calibrate	Install	Replace	Repair	Overhaul	Rebuild	Tools and equipment	Remarks
15	FRAME													
1501	Frame Assembly	F							D					
	Pivot pins and bushings				F				F					
1503	Pintle Attachments	O							O					
18	BODY, HOOD													
1801	Hood Assembly													
	Hood, panels, shroud								O	F				
1805	Floors (platform)								F	F				
1806	Seats								O	F				
1808	Boxes								O	F				
43	HYDRAULIC SYSTEM													
4300	Hydraulic System	O		O										
4301	Strainers, filter, hose fittings													
	Tubing	O							O					
	Filter			O					O					
	Hose								O	O				
4302	Pump and Pump Drive								O	H				
4305	Manifold and/or Control Valves								F	H				
4307	Hydraulic Cylinders								O	H				
4308	Reservoirs													
	Breather			O					O					
	Reservoir			O					F	F				
4309	Manual Controls Lever and Linkage				O				O					
50	PNEUMATIC EQUIPMENT													
5000	Air Compressor	O							O	H				
	Governor				O				O					
74	EARTH MOVING, EQUIPMENT COMPONENTS													
7436	Lift Arms and Pivot Assembly	F							F					
	Bar, boom, carrier			O					H	F				
7437	Moldboard Assembly			O	O				O	O	F			
76	FIRE FIGHTING EQUIPMENT COMPONENTS													
7603	Fire Extinguisher	C		O					O					

By Order of the Secretary of the Army:

W. C. WESTMORELAND,
General, United States Army,
Chief of Staff.

Official:
KENNETH G. WICKHAM,
Major General, United States Army,
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Distribution:

To be distributed in accordance with DA Form 12-25, Sec II (qty rqr Block #402), Organizational maintenance requirements for Earthmoving Equipment: Loaders.

Changes in force: C 3, C 4, C 5

TM 5-3805-239-12
C 3

CHANGE }
NO. 3 }

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., *27 January 1970*

Operator and Organizational Maintenance Manual

LOADER, SCOOP TYPE, PHEUMATIC TIRED, DIESEL ENGINE DRIVEN, HINGED FRAME STEER, WITH 2 ½ CU. YD. MULTI-PURPOSE BUCKET, (ALLIS CHALMERS MODEL 645M) FSN 3805-051-9359

TM 5-3805-239-12, dated 5 July 1968 is changed as follows:

Page 1-2. Paragraphs *d* and *e* are rescinded.

Page 1-2. Record and Report Forms is superseded as follows:

1-2. Forms and Records

a. Maintenance forms, records, and reports which are to be used by maintenance personnel at all maintenance levels are listed in and prescribed by TM 38-750.

b. Report of errors, omissions, and recommendations for improving this publication by the individual user is encouraged. Reports should be submitted on DA Form 2028, Recommended Changes to Publications, and forwarded direct to the Commanding General, U. S. Army Mobility Equipment Command, ATTN: AMSME-MPP, 4300 Goodfellow Boulevard, St. Louis, Mo. 63120.

Page 1-5. (15) Nut and screw torque data, Engine flywheel to flex plate screws. Change torque value from 41-49 to read 33-40 ft. lbs.

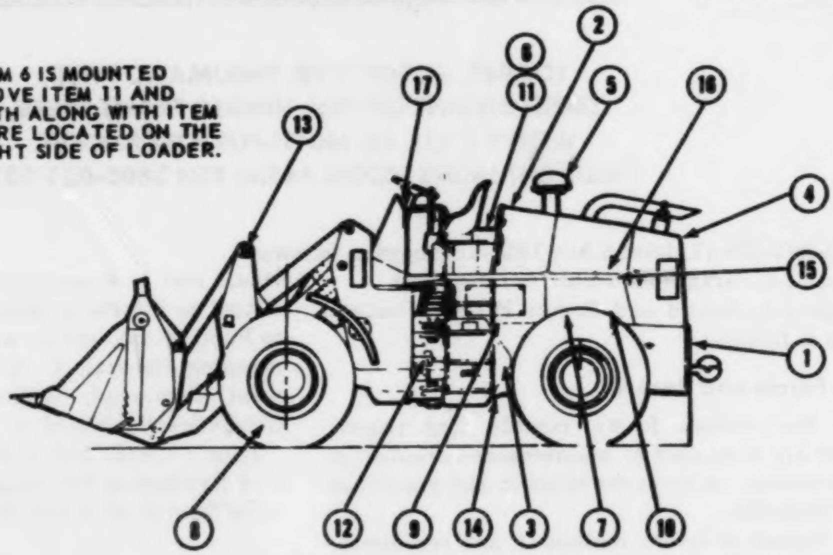
Page 3-4. **Figure 3-3(1) is superseded as follows:**

PREVENTIVE MAINTENANCE SERVICES

DAILY

TM 5-3805-239-12 **ALLIS-CHALMERS MODEL 645M** **SCOOP-TYPE LOADER**

NOTE: ITEM 6 IS MOUNTED ABOVE ITEM 11 AND BOTH ALONG WITH ITEM 7 ARE LOCATED ON THE RIGHT SIDE OF LOADER.



LUBRICATE IN ACCORDANCE WITH CURRENT LUBRICATION ORDER

ITEM		PAR REF
1	FUEL TANK. Drain condensation and sediment. Add fuel as required.	3-9
2	HYDRAULIC SYSTEM. Check oil level.	3-4
3	TRANSMISSION. Check oil level.	3-4
4	RADIATOR. Check coolant level. Proper level is within one inch of top of radiator.	3-62
5	AIR CLEANER. Check restriction indicator. Remove flexible unloader and clean unloader.	3-9
6	BATTERIES. Tighten loose cables and mountings. Remove corrosion. Fill with water to level indicated. In freezing weather run the engine a minimum of one hour after adding water. Clean vent holes in filler caps (weekly).	3-100
7	ENGINE CRANKCASE. Check oil level and replenish as necessary.	3-4

MEC 3805-239-12/3-3 ①

Figure 3-3(1). Daily preventive maintenance services.

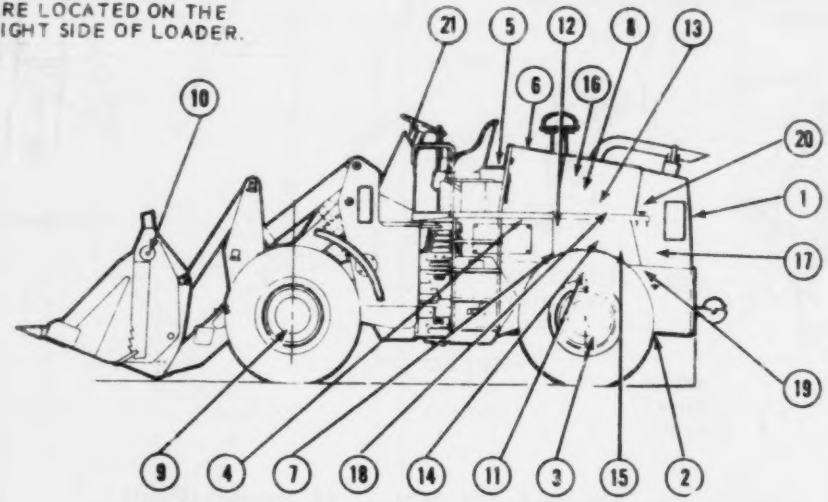
Page 3-6. **Figure 3-4(1) is superseded as follows:**

PREVENTIVE MAINTENANCE SERVICES

QUARTERLY

TM 5-3805-239-12 ALLIS-CHALMERS MODEL 645M SCOOP-TYPE LOADER

NOTE: ITEMS 5, 11, AND 12
ARE LOCATED ON THE
RIGHT SIDE OF LOADER.



LUBRICATE IN ACCORDANCE WITH CURRENT LUBRICATION ORDER

ITEM		PAR REF
1	RADIATOR. Check for leaks. Check cooling fins for damage.	3-62
2	AXLE DIFFERENTIALS. Check oil level. (Also check at 100 hours.)	3-4
3	PLANETARY HUBS. Check oil level. (Also check at 100 hours.)	3-4
4	BRAKE MASTER CYLINDERS. Check fluid level. (Also check at 100 hours.)	3-82
5	BATTERIES. Check specific gravity. (Also check at 100 hours.)	3-100
6	HYDRAULIC SYSTEM. Replace filter element. Clean screen and magnet. Tighten fittings. Check and adjust operation.	3-92
7	ENGINE OIL FILTERS. Replace filters. (Also replace filters at 100 hours.)	3-4

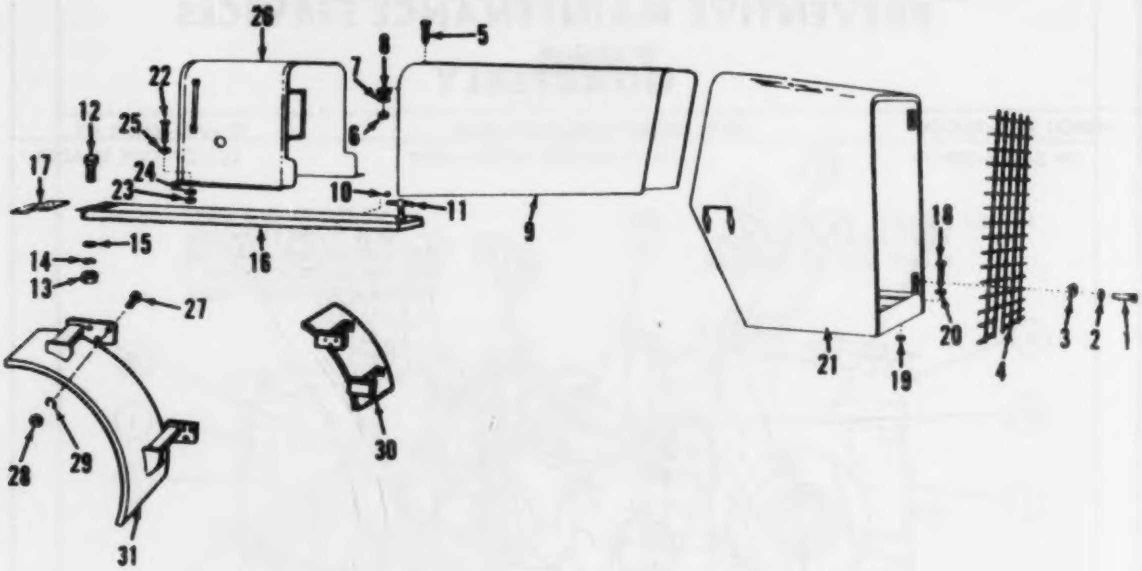
MEC 3805-239-12/3-4 ①

Figure 3-4(1). Quarterly preventive maintenance services.

Page 3-9. Paragraph 3-9b(2) *(a)*, in line 1, delete (fig. 3-6), and substitute (fig. 3-5).

Page 3-9. Paragraph 3-9*b*(2) *(e)*, in line 2, of fuel filter is changed to read, of fuel filter (fig. 3-5).

Page 3-21. Figure 3-15 is superseded as follows:



1 Screw, cap, hex-head, 3/8-24 x 1-3/4 in. (4 rqr)
2 Washer, lock, 3/8 in. (4 rqr)
3 Clip (4 rqr)
4 Radiator grille
5 Screw, cap, hex-head, 3/8-24 x 1 in. (2 rqr)
6 Nut, 3/8-24 (2 rqr)
7 Washer, lock, 3/8 in. (2 rqr)
8 Washer, flat, 3/8 in. (2 rqr)
9 Engine hood
10 Grommet (6 rqr)
11 Fender latch (2 rqr)
12 Screw, cap, hex-head, 3/8-24 x 1 in. (6 rqr)
13 Nut, 3/8-24 (6 rqr)
14 Washer, lock, 3/8 in. (6 rqr)
15 Washer, flat, 3/8 in. (6 rqr)
16 Fender (2 rqr)
17 Support (2 rqr)
18 Screw, cap, hex-head, 5/8-18 x 2-1/4 in. (4 rqr)
19 Nut, 5/8-16 (4 rqr)
20 Washer, flat, 5/8 in. (4 rqr)
21 Radiator support
22 Screw, cap, hex-head, 3/8-24 x 1 in. (4 rqr)
23 Nut, 3/8-24 (4 rqr)
24 Washer, lock, 3/8 in. (4 rqr)
25 Washer, flat, 3/8 in. (4 rqr)
26 Air cleaner hood
27 Screw, cap, hex-head, 1/2-20 x 1-3/4 in. (12 rqr)
28 Nut, 1/2-20 (12 rqr)
29 Washer, lock, 1/2 in. (12 rqr)
30 Right front fender
31 Left front fender

MEC 3805-239-12/3-15

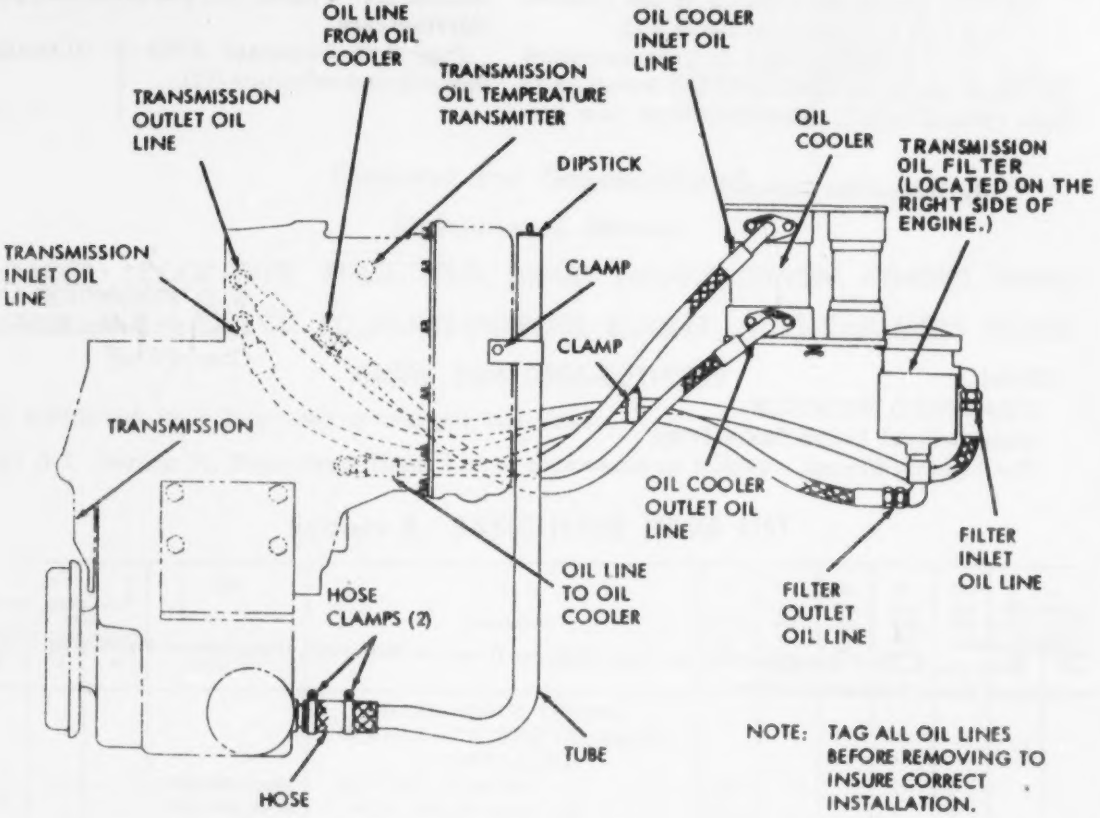
Figure 3-15. Hood and Fenders, exploded view.

Page 3-37. Paragraph 3-63*b* (1), in line 1, delete 3-61 and substitute 3-62.

Page 3-37. Paragraph 3-63*c* (3), in line 1, delete 3-61, and substitute 3-62.

Page 3-37. Paragraph 3-64*b*, in line 1, delete paragraph 3-63, and substitute figure 3-33.

Page 3-46. Figure 3-40 is superseded as follows:


OIL LINE FROM OIL COOLER
OIL COOLER INLET OIL LINE
TRANSMISSION OIL TEMPERATURE TRANSMITTER
TRANSMISSION OUTLET OIL LINE
OIL COOLER
TRANSMISSION OIL FILTER (LOCATED ON THE RIGHT SIDE OF ENGINE.)
DIPSTICK
TRANSMISSION INLET OIL LINE
CLAMP
CLAMP
TRANSMISSION
OIL COOLER OUTLET OIL LINE
FILTER INLET OIL LINE
OIL LINE TO OIL COOLER
HOSE CLAMPS (2)
FILTER OUTLET OIL LINE
TUBE
HOSE

NOTE: TAG ALL OIL LINES BEFORE REMOVING TO INSURE CORRECT INSTALLATION.

STEP 1. REMOVE DIPSTICK FROM TUBE.
STEP 2. REMOVE SCREW AND REMOVE CLAMP FROM TUBE.
STEP 3. LOOSEN TWO HOSE CLAMPS AND REMOVE HOSE AND TUBE FROM TRANSMISSION.
STEP 4. REMOVE SCREW AND LOCK WASHER AND REMOVE CLAMP FROM FILTER OIL LINES.
STEP 5. DISCONNECT TWO OIL LINES FROM OIL FILTER.
STEP 6. DISCONNECT TWO OIL LINES FROM TRANSMISSION. REMOVE ADAPTERS AND PACKING FROM TRANSMISSION.
STEP 7. REMOVE FOUR SCREWS, LOCK WASHERS, AND FLAT WASHERS AND REMOVE TWO OIL LINES AND GASKETS FROM OIL COOLER.
STEP 8. DISCONNECT OIL LINE FROM OIL COOLER FROM TEE AND REMOVE TEE FROM TRANSMISSION.
STEP 9. DISCONNECT OIL LINE TO OIL COOLER FROM TRANSMISSION AND REMOVE ELBOW AND PACKING FROM TRANSMISSION.
STEP 10. DISCONNECT WIRES AND REMOVE TRANSMISSION OIL TEMPERATURE TRANSMITTER FROM TRANSMISSION.

MEC 3805-239-12/3-40

Figure 3-40. Transmission oil lines, removal and installation.

Page 3-47. Paragraph 3-72*d* (1), in line 1, delete 3-40 and substitute 3-41.

Page 3-49. Paragraph 3-75c, in lines 1 and 5, delete (para 1-14 (15), and substitute (para 3-76c (1).

Page 3-54. Paragraph 3-79*b* (2), in line 1, delete paragraph 3-12, and substitute figure 3-12.

Page 3-71. Paragraph 3-92*b* (1) *(f)* is superseded as follows: Refer to figure 3-64 and install valve plate (6) and bypass valve (5). Install new preformed packing (4), filter cover (3), washer (2), and tighten screws (1) to a torque of 29 to 39 foot pounds.

Page 3-71. Paragraph 3-92*b* (3) *(c)*, delete lines 2 and 3 and add as follows: Remove baffle (20), strainer (21), magnet (22), and preformed packing (23) from cage.

Page 3-71. Paragraph 3-92*b* (3) *(f)*, in line 2, delete (3) and substitute (12).

By Order of the Secretary of the Army:

W. C. WESTMORELAND,
General, United States Army,
Chief of Staff.

Official:
KENNETH G. WICKHAM,
Major General, United States Army,
The Adjutant General.

Distribution:
To be distributed in accordance with DA Form 12-25, Sec II (qty rqr Block #402), Organizational maintenance requirements for Earth Moving Equipment: Loaders.

Changes in force: C 1, C 2

TM 5-3805-239-12
C 2

CHANGE }
No. 2 }

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., *25 April 1969*

Operator and Organizational
Maintenance Manual
LOADER, SCOOP-TYPE, PNEU-TIRED, DIESEL ENGINE DRIVEN, HINGED FRAME STEER, WITH 2½ CU YD MULTI-PURPOSE BUCKET, ALLIS-CHALMERS MODEL 645M, FSN 3805-051-9359

TM 5-3805-239-12, 5 July 1968, is changed as follows:

Page B-3. Section II, Basic Issue Items List is superseded as follows:

Section II. BASIC ISSUE ITEMS LIST

(1) Source, maint, and recov code			(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9) Illustration	
(A) S	(B) M	(C) R	Federal stock No.	Description	Unit of issue	Qty inc in unit pack	Qty inc in unit	Qty furn with equip	Qty auth	(A) Fig No.	(B) Item No.
				BASIC ISSUE ITEMS—MANUFACTURER OR DEPOT INSTALLED							
P	C		7510-889-3494	BINDER, Looseleaf	EA			1	1		
P	C		7520-559-9618	CASE, Maintenance and Operation Manuals.	EA			1	1		
P	C		4210-889-2221	EXTINGUISHER, Fire	EA			1	1		
				DA TECHNICAL MANUAL							
				TM 5-3805-239-12.	EA			1	1		
				DA LUBRICATION ORDERS							
				LO 5-3805-239-12-1	EA			1	1		
				LO 5-3805-239-12-2	EA			1	1		

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To be distributed in accordance with DA Form 12-25, Section II (qty rqr block No. 402) organizational maintenance requirements for Earth Moving Equipment: Loader.

GPO 905-470

TM 5-3805-239-12
C 1

CHANGE No. 1

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON D.C., *8 November 1968*

Operator and Organizational Maintenance Manual

LOADER SCOOP TYPE, PNEU-TIRED, DIESEL ENGINE DRIVEN, HINGED FRAME STEER, WITH 2½ CU YD MULTI-PURPOSE BUCKET, (ALLIS CHALMERS MODEL 645M)

FSN 3805-051-9350

TM 5-3805-239-12, July 1968, is changed as follows:

Page 3-63. In paragraph 3-85*e*, the following is added after the last line: Reference TM 5-9790 (Aeroquip Flexible Hose Lines and Detachable Reuseable Fittings) and TB 700-4720-1 (Hose Assembly Handbook — Cross Reference Data for Local Fabrication of Flexible Hose Assemblies).

Page A-1. The following is added to paragraph A-5:

TM 5-9790	Aeroquip Flexible Hose Lines and Detachable Reuseable Fittings.
TB 700-4720-1	Hose Assembly Handbook — Cross Reference Data for Local Fabrication of Flexible Hose Assemblies.

Page C-6. In Fuctional Group 4301 the following is added after Filter assembly:

Hoses . . . . Replace — O, Repair — O.

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To be distributed in accordance with DA Form 12-25, Sec II (qty rqr Block No. 402), Organizational maintenance requirements for Earthmoving equipment, Loaders.

TECHNICAL MANUAL
No. 5-3805-239-12

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., *5 July 1968*

OPERATOR AND ORGANIZATIONAL MAINTENANCE MANUAL

LOADER SCOOP TYPE, PNEU-TIRED, DIESEL ENGINE DRIVEN, HINGED FRAME STEER, WITH 2½ CU YD MULTI-PURPOSE BUCKET, ALLIS CHALMERS MODEL 645M

FSN 3805-051-9359

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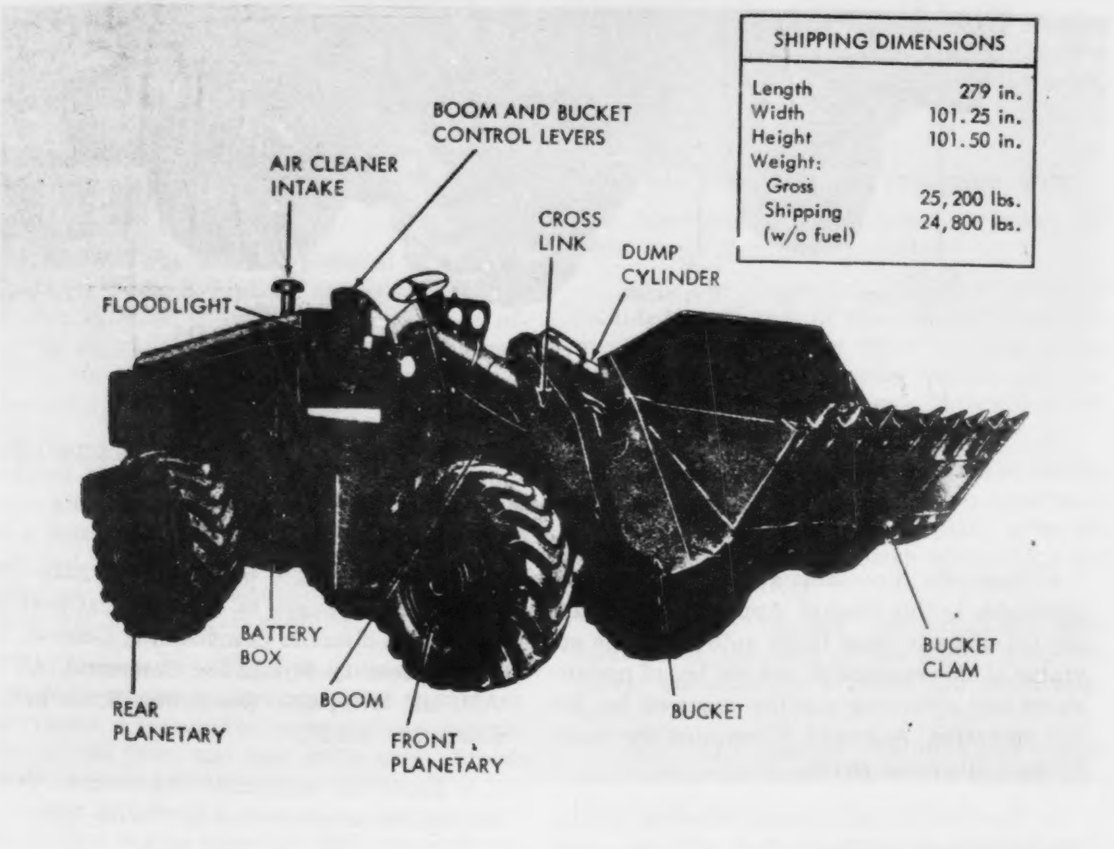
CHAPTER 1

INTRODUCTION

Section I. GENERAL

1-1. Scope

a. These instructions are published for use of personnel to whom the articulated scoop-type loader (figs. 1-1 and 1-2) is issued. They provide information on the operation and organizational maintenance of the equipment. Also included are descriptions of main units and their functions in relationship to other components.



SHIPPING DIMENSIONS	
Length	279 in.
Width	101.25 in.
Height	101.50 in.
Weight:	
Gross	25,200 lbs.
Shipping (w/o fuel)	24,800 lbs.

MEC 3805-239-12/1-1

Figure 1-1. Model 645M scoop-type loader, right front, three quarter view, with shipping dimensions.

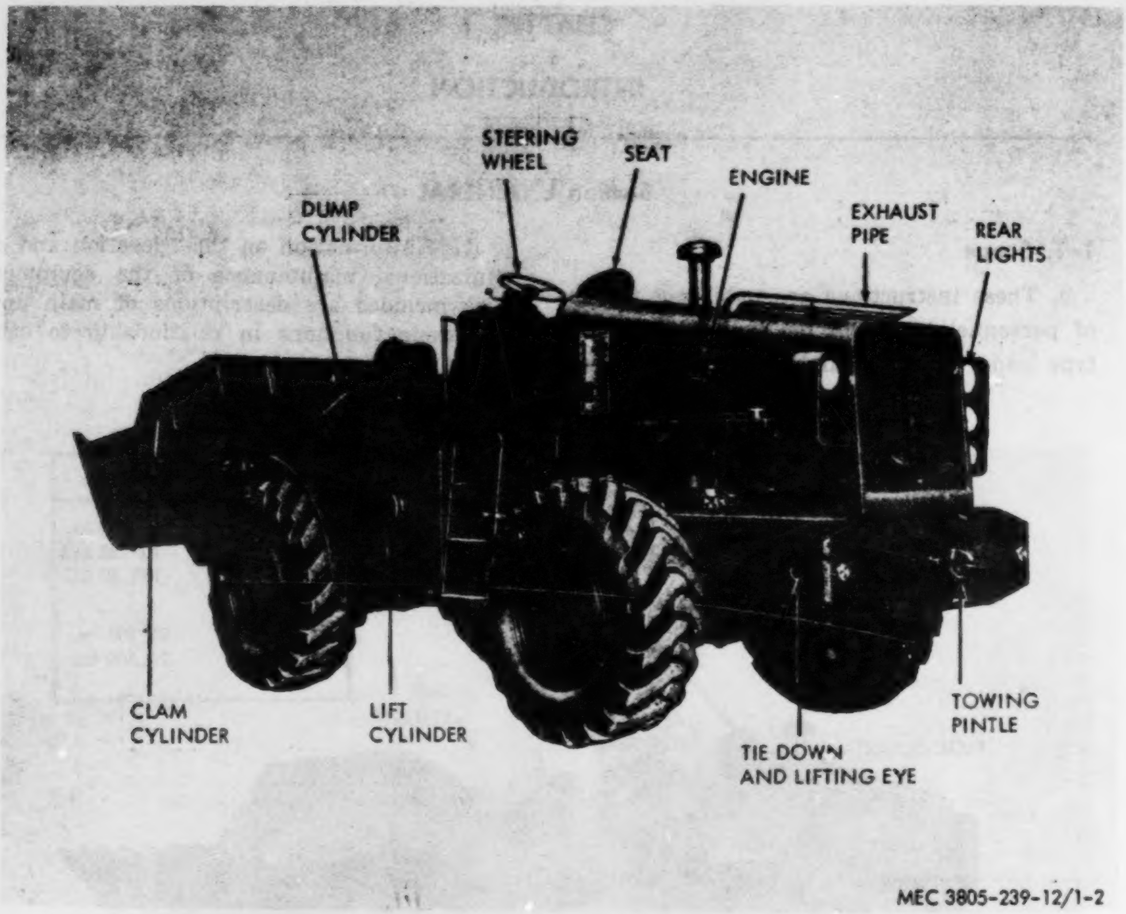


Figure 1-2. Model 645M scoop-type loader, left rear, three quarter view.

b. Appendix A contains a list of publications applicable to this manual. Appendix B contains the list of basic issue items authorized the operator of this equipment and the list of maintenance and operating supplies required for initial operation. Appendix C contains the maintenance allocation chart.

c. Numbers in parentheses following nomenclature callouts on illustrations indicate quantity: numbers preceding callouts indicate preferred maintenance sequence.

d. Report of errors, omissions, and recommendations for improving this publication by the individual user is encouraged. Reports should be submitted on DA Form 2028 (Recommended Changes to DA Publications) and forwarded direct to Commanding General, U.S. Army Mobility Equipment Command, ATTN: AMSME-MPP, 4300 Goodfellow Boulevard, St. Louis, Mo. 63120.

e. Report all equipment improvement recommendations as prescribed by TM 38-750.

1-2. Record and Report Forms

a. DA Form 2258 (Depreservation Guide for Vehicles and Equipment).

b. For other record and report forms applic-

able to the operator, crew and organizational maintenance, refer to TM 38–750.

***Note.* Applicable forms, excluding Standard Form 46 (United States Government Motor Vehicle Operator's Identification Card) which is carried by the operator, shall be kept in a canvas bag mounted on the equipment.**

Section II. DESCRIPTION AND TABULATED DATA

1–3. Description

a. Loader. The Model 645M scoop-type loader is a four-wheel drive, rubber tired, articulated, multi-purpose bucket front end loader. A 2½ cubic yard bucket (fig. 1–1), mounted on the front end of the loader is hydraulically operated. Two lift cylinders (fig. 1–2) raise the bucket by lifting the boom (fig. 1–1). Two dump cylinders (fig. 1–1) operate cross links (fig. 1–1) to dump and retract the bucket. The bucket has two cylinders (fig. 1–2), one mounted on each side, which operate the bucket clam. The bucket can be used as a front end bucket loader, a clam-type bucket, a bulldozer, and a scraper.

b. Engine. The loader is powered by an Allis Chalmers Model 3500 diesel engine. The engine is a six cylinder, in-line, four cycle engine, offering direct injection and is turbocharged. The engine (fig. 1–2) is mounted at the rear of the loader, behind the operator.

c. Torque Converter. The engine is directly coupled to a two-stage, four element torque converter. The converter multiplies the torque to a maximum of 5.1 to 1 and transmits it to the full power shift transmission. Power is supplied to the transmission charging pump whenever the engine is running.

d. Transmission. The transmission provides two forward speeds and one speed in reverse. Universal drive shafts connect the transmission to the front and rear drive axles. Speeds ranging from 5.5 mph (miles per hour) in low range to 21.8 mph in high range are produced at a rated engine speed of 2200 rpm (revolutions per minute) governed speed at full load.

e. Hydraulic System. The hydraulic pump (tandem), flange mounted and driven by the transmission power take-off, provides hydraulic oil flow to operate the control valve, two lift cylinders, two dump cylinders, and two clam cylinders and also assists the power steering. A separate pump provides oil flow for the power steering system.

f. Frame. The frame is articulated for maximum maneuverability. The two sections, a front or operating section, and a rear or power section, are connected with forged and heat treated pins. All four wheels are powered through differentials and drive axles. Steering is accomplished by pivoting the front section on the connecting pins by two double acting hydraulic cylinders.

1–4. Identification and Tabulated Data

a. Identification. The scoop-type loader has eight major identification plates.

(1) The Corps of Engineers plate is mounted at the rear of the operator's compartment on the air cleaner shield. It gives official nomenclature; stock, model, serial, registration, and contract numbers; dimensions; engine identification and other data.

(2) The transportation data plate, located at the rear of the operator's compartment below the Corps of Engineers plate, gives the axle loads in pounds, tie down instructions and the center of gravity.

(3) The bucket identification plate mounted on the back of the bucket gives the bucket manufacturer's model and serial number.

(4) The engine identification plate mounted on the right side of the engine gives the engine model and serial number.

(5) The fuel injector pump identification plate is on the side of the pump.

(6) The air compressor serial number plate is mounted on the side of the compressor crankcase and gives the model and serial number.

(7) The transmission identification plate is mounted on the left side of the transmission

sump and gives the model and serial number.

(8) The service and lubrication plate is mounted on the left side of the air cleaner shield and gives service intervals, lubricants, locations, and quantities.

b. Tabulated Data.

(1) *Scoop-type loader.*

Manufacturer	Allis-Chalmers
Model	645M
Type	Rubber-tired, four wheeled articulated
Serial numbers	8001 thru 9016

(2) *Engine.*

Manufacturer	Allis-Chalmers
Type	6 cylinder, in-line, four cycle, diesel
Model	3500
Bore	4.25 in.
Stroke	5.00 in.
Fuel	Diesel
Piston displacement	426 cu. in.
Compression ratio	16:1
Number of main bearings	7
Crankshaft rotation (viewed from fan end)	Clockwise
Firing order	1-5-3-6-2-4
Low idle speed	650–700 rpm
Fast idle speed	700–1000 rpm
High idle (no load)	2375–2425 rpm
Rated horsepower	157 at 2200 rpm

(3) *Fuel injector pump.*

Make	Roosa Master
Model	DC
Type	Single cylinder, opposed plunger, w/integral governor

(4) *Generator (Alternator).*

Make	Motorola
Part number	MH24N-9016
Drive	Belt
Output	35 Amps

(5) *Starter.*

Make	Delco-Remy
Model	1113868
Drive	Overrunning clutch

(6) *Transmission.*

Make	Allison
Part number	6833536
Model	TT2420-1
Type	Torque converter, planetary gear
Speeds	2 forward, 1 reverse
Rotation (viewed from input end):	
Input	Clockwise
Output (forward operation)	Clockwise
Torque converter:	
Type	2 stage, 2 phase, 4 element
Multiplication	5.1:1
Model	TT425
Gear ratios (includes 0.846:1 transfer):	
Forward (low range)	2.663:1
Forward (high range)	0.669:1
Reverse	1.964:1

(7) *Bucket.*

Make	Drott
Part number (w/teeth)	951927
Capacity	2½ cu. yd.
Number of teeth	9
Width	101.25. in.
Weight (w/bucket teeth)	2800 lbs.

(8) *Steering system.*

Pump:	
Make	Commercial
Model	D230–29
Type	Gear
Drive	Transmission power take-off
Cylinders:	
Make	Allis Chalmers
Part number	3050882
Steering gear assembly:	
Make	Saginaw
Part number	7804252

(9) *Air cleaner.*

Make	Donaldson
Part number	FWG12–0061
Type	Dry (2-stage)

(10) *Hydrauiic control valve.*

Make	Parker–Hannifin
Part number	Vops–P25DDF25
Type	3 spool

(11) *Axles.*

Make	Rockwell-Standard
Part number:	
Front	3050893
Rear	3050894
Differentials:	
Front	A3200–k–765
Rear	A31–3200–Z–780

(12) *Hydraulic cylinders.*

Dump Clyinders:	
Make	Allis Chalmers
Part number:	
Right	3050878
Left	3050877
Lift cylinders:	
Make	Allis Chalmers
Part number:	
Right	3050872
Left	3050871

Clam cylinders:	
Make	Drott
Part number:	
Right	501680
Left	501681

(13) *Tires.*

Make	General
Type	Tubeless, loader grader
Pressure	45 psi
Ply	12
Size	17.5 x 25

(14) *Capacities.*

Fuel tank	59 gallons
Radiator	42 quarts
Engine crankcase (less filter)	16 quarts
Engine crankcase (with filter)	24 quarts
Transmission and converter	31 quarts
Differentials:	
Front	27 quarts
Rear	20 quarts
Planetary hubs (each)	3 quarts
Steering gear	1½ pounds
Hydraulic system	54 gallons
Hydraulic reservoir	26 gallons
Hydraulic brake system	2 pints

(15) *Nut and screw torque data.*

Item	*Torque (foot-pounds)*
Cylinder head screws	130–140
Main bearing cap screws	170–190
Connecting rod cap screws	65–70
Rocker cover	3–4
Fuel injector pump shaft retaining nut	35-40
Fuel injector nozzle nut	40–60
Fuel injector nozzle cap lock	75–90
Nozzle holder cap	75–90
Rocker arm shaft plug	40
Turbocharger mounting nut	18–21
Turbine housing clamp nut	5–10 (inch pounds)
Turbocharger housing screws	80–100 (inch pounds)
Turbocharger impeller nut	80–100 (inch pounds)
Turbocharger diffuser to housing screws	28–33
Turbocharger bearing housing plug	140–200 (inch pounds)
Water pump mounting screws	18–21
Alternator mounting screws	18–21
Hydraulic pump nuts	190–200
Transmission:	
Converter pump cover nuts	17–20
Converter pump mounting screws	17–20
Converter mounting screws	42–50
Oil charging pump screws	26–32
Planetary cover screws	36–43
High range clutch piston housing screws	83–100
Front cover screws	26–32
Yoke shaft nuts	600–800
Parking brake mounting screws	81–97
Front yoke flange screws	41–49
Engine flywheel to flex plate screws	41–49
Mounting bracket screws	30–35
Filter center screw	25–30
Engine to bell housing screws	30–35
Cylinder piston lock nuts	1400–1500
Lift cylinder head	1400–1500
Dump cylinder head	1400–1600
Frame pivot pins	2000
Pivot flange to front section	55–60
Axle anchor pins	900–950
Axle support pins	1325–1375
Drive shaft universal joint yoke nut	340–360
Universal joint base screws	200–220
Starter mounting screws	13–17
Steering gear cover screws	25–35
Valve adapter screws	25–35
Seal assembly screws	17–23
Mast jacket screws	17–23
Steering thrust bearing nut	20–30
Steering arm nut	100–125
Lash adjustment lock nut	25–35
Housing plug	15–25
Hose fittings	20–30
Wheel nuts	365–400

Standard screw torques (foot-pounds)

Size	*Grade 2*	*Grade 5*	*Grade 8*
1/4–20	5–7	9–11	12–14
1/4–28	6–8	11–13	14–16
5/16–18	11–13	18–20	45–27
5/16–24	13–15	21–23	28–30
3/8–16	18–21	28–33	41–46
3/8–24	19–22	3–35	48–48
7/16–14	30–33	44–49	69–74
7/16–20	32–35	50–55	72–77
1/2–13	45–50	68–73	95–105
1/2–20	45–50	68–73	95–105
9/16–12	60–65	95–105	130–140
9/16–18	60–65	95–105	130–140
5/8–11	75–85	125–135	170–190
5/8–18	75–85	125–135	170–190
3/4–10	125–135	210–230	290–310
3/4–16	125–135	210–230	290–310
7/8–9	105–115	290–310	450–500
7/8–14	105–115	290–310	450–500
1–8	140–150	380–410	600–630
1–14	450–475		

Note. All torque values are calculated for threads lubricated with oil.

(16) **Adjustment data.**

Exhaust valves:	
Valve lift (at valve)	0.4125 inch
Valve lift (at cam)	0.2850 inch
Seat angle	45°
Valve clearance (cold)	0.0180 inch
Valve clearance (hot)	0.0150 inch
Intake valves:	
Valve lift (at valve)	0.4620 inch
Valve lift (at cam)	0.3180 inch
Seat angle	30°
Valve clearance (cold)	0.0180 inch
Valve clearance (hot)	0.0150 inch
Fan belts (depression midway between pulleys)	3/16 to 1/2 inch
Compressor belt (depression midway between pulleys)	1/2 inch

(17) *Dimensions and weight* (*fig. 1-1*).

Overall Length (Bucket Tooth)	279 inches
Overall Width	101.25 inches
Overall Height	101.50 inches
Net Weight (Shipping-w/o fuel)	24,800 pounds
Net Weight (Gross)	25,200 pounds

(18) *Wiring diagram.* Refer to figure 1-3 for a schematic wiring diagram of the loader electrical circuits.

1-5. Difference in Models

This manual covers only the Allis-Chalmers 645M scoop-type loader. No known unit differences exist for the model covered by this manual.

Figure 1-3—Continued.

1 Headlight
2 Floodlight (4)
3 Auxiliary floodlight
4 Parking and directional light (2)
5 Panel light (2)
6 Converter temperature warning light
7 Circuit breaker
8 Light switch
9 Stop light switch
10 Battery (2)
11 Slave receptacle
12 Circuit breaker
13 Ground
14 Auxiliary starter solenoid
15 Starting motor
16 Starter solenoid
17 Blackout stop and taillight
18 Stop and taillight (2)
19 Terminal board
20 Fuel shut off
21 Generator (alternator)
22 Voltage regulator
23 Hourmeter
24 150 ohm resistor
25 Polarity protector
26 Oil pressure transmitter
27 Neutral start switch
28 Air pressure transmitter
29 Directional light switch
30 Horn
31 Horn button
32 Circuit breaker
33 Ammeter
34 Blackout headlight
35 Air pressure warning light
36 Master switch
37 Auxiliary floodlight switch
38 Floodlight switch
39 Converter temperature warning buzzer
40 Air pressure warning buzzer
41 Converter temperature transmitter

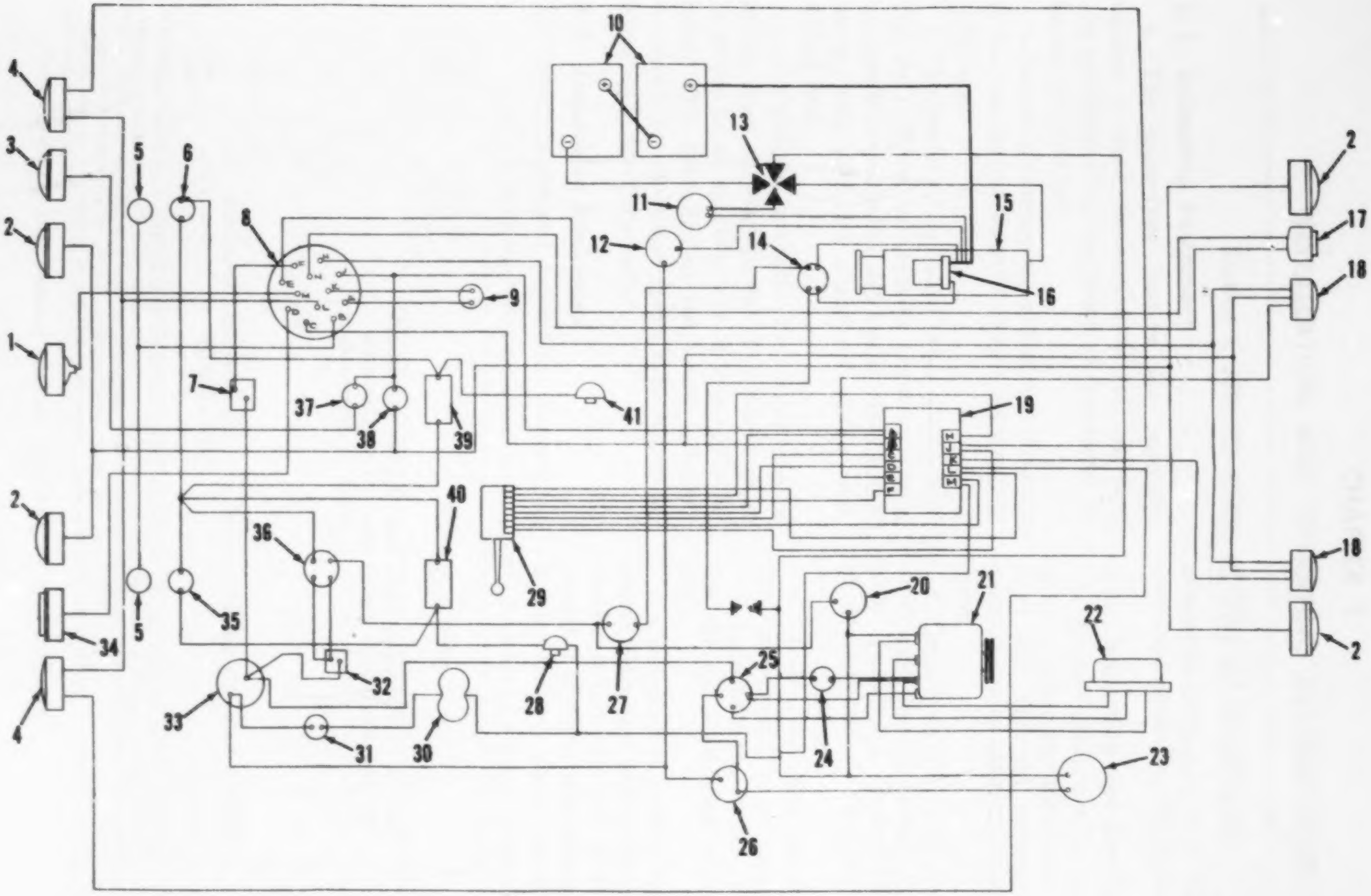


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Figure 1-3. Schematic wiring diagram.

CHAPTER 2

INSTALLATION AND OPERATING INSTRUCTIONS

Section I. SERVICE UPON RECEIPT OF EQUIPMENT

2-1. Unloading Equipment

a. The scoop-type loaders are normally shipped to their destination on railroad cars and are blocked and tied down as illustrated on figures 2-1 and 2-2.

b. Remove all straps, tie downs, and blocking to free the loader. Remove straps and blocking with care.

c. The loader is equipped with lifting eyes (fig. 2-1). When an adequate crane or lifting equipment is available, lift loader from transporter with sufficient slings, or chains with spread bars.

d. If a ramp is available, the loader may be driven from the transporter. The loader must be driven by an operator who is thoroughly familiar with operation of the loader. Prepare the loader for operation (para 2-3) before attempting to move the loader.

2-2. Unpacking Equipment

The loader is shipped assembled. Remove all protective strapping, tape, and any protective coverings applied to the loader.

2-3. Inspecting and Servicing Equipment

a. Inspect identification plates on loader for serial number and other information and compare with data on accompanying invoice or packing slip to ensure receipt of proper equipment.

b. Inspect entire loader for evidence of loss or damage during transit. Inspect loader for loose connections, broken lines, and tightness of attachments and fittings. Check all parts for secure mounting.

c. Perform the daily preventive maintenance services described in paragraph 3-6.

d. Lubricate the loader in accordance with the current lubrication order and paragraph 3-4.

e. Check engine cooling system Remove radiator filler cap and if necessary, add proper coolant within one inch of top of radiator for expected ambient temperature. Refer to table 2-1 for Military Antifreeze Materials.

Table 2-1. Freezing Points, Composition, and Specific Gravities of Military Antifreeze Materials

Lowest expected ambient temp. °F	Pints of inhibited glycol per gal. of coolant [1]	Compound, antifreeze arctic [2]	Ethylene glycol coolant solution specific gravity at 68° F [3]
+20	1 ½	Issued full strength and ready mixed for 0° to −65° temperatures for both initial installation and replenisment of losses.	1.022
+10	2		1.036
0	2 ¾		1.047
−10	3 ¼		1.062
−20	3 ½		1.062
−30	4°		1.067
−40	4 ¼		1.073
−50	Artic Antifreeze preferred.	DO NOT DILUTE WITH WATER OR ANY OTHER SUBSTANCE.	
−60			
−75			

[1] Maximum protection is obtained at 60 percent by volume (4.8 pints of ethylene glycol per gallon of solution).

[2] Military Specification MIL-C-11755 Arctic type, nonvolatile antifreeze compound is intended for use in the cooling systems of liquid-cooled internal combustion engines. It is used for protection against freezing primarily in Arctic regions where the ambient temperature remains for extended periods close to −40° F or drops below, to as low as −90° F.

[3] Use an accurate hydrometer. To test hydrometer, use 1 part ethylene glycol antifreeze to 2 parts water. This should produce a hydrometer reading of 0° F

Note. **Fasten tag near radiator filler cap indicating the type antifreeze.**

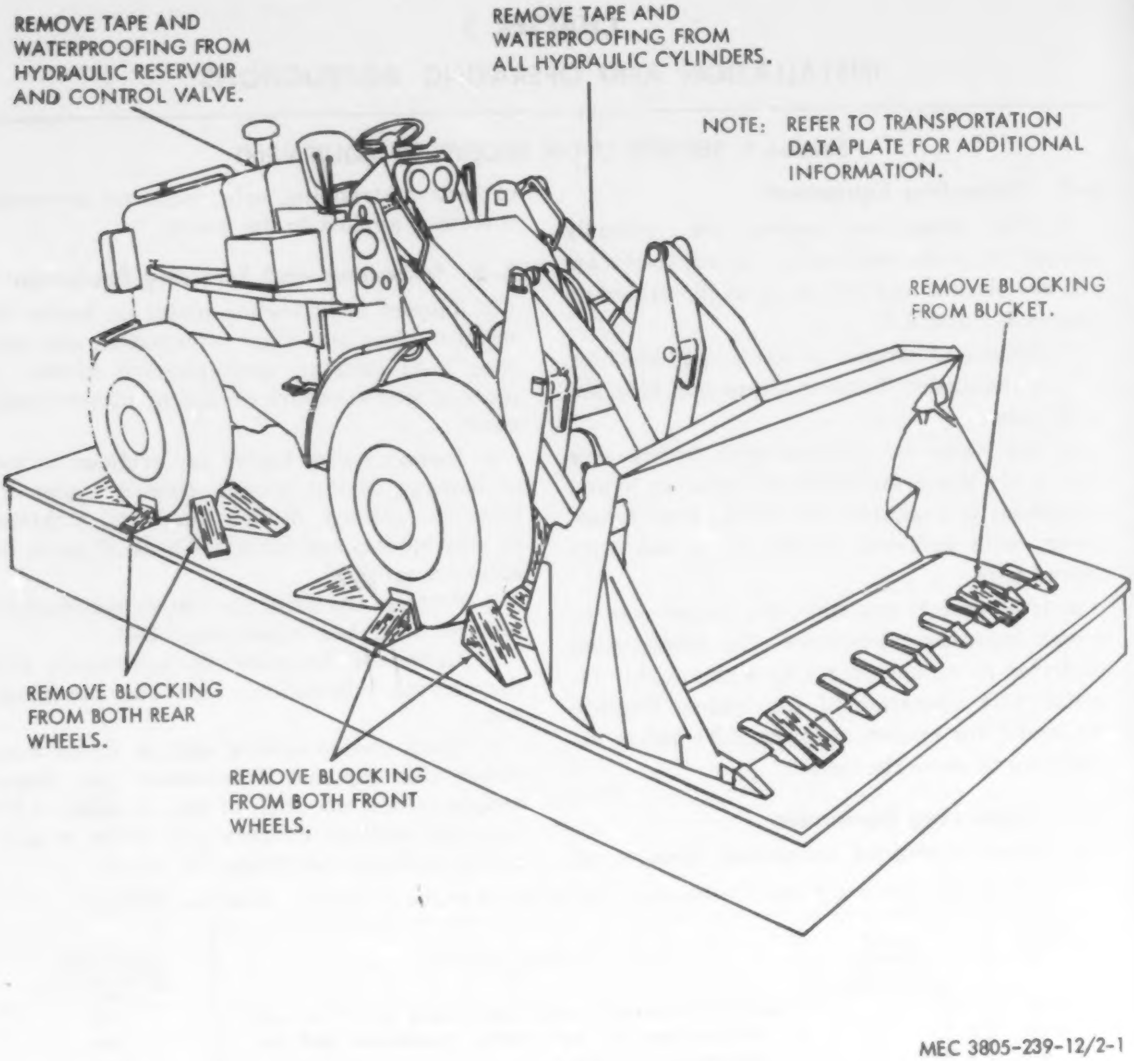

REMOVE TAPE AND WATERPROOFING FROM HYDRAULIC RESERVOIR AND CONTROL VALVE.
REMOVE TAPE AND WATERPROOFING FROM ALL HYDRAULIC CYLINDERS.
NOTE: REFER TO TRANSPORTATION DATA PLATE FOR ADDITIONAL INFORMATION.
REMOVE BLOCKING FROM BUCKET.
REMOVE BLOCKING FROM BOTH REAR WHEELS.
REMOVE BLOCKING FROM BOTH FRONT WHEELS.
MEC 3805-239-12/2-1

Figure 2-1. Scoop-type loader shipping and unloading details, right side view.

f. Engine is shipped with a preservative oil in crankcase. Drain crankcase and fill with correct grade of engine oil (OE). Refer to current lubrication order (para 3-4).

g. If loader is to be put into operation in cold weather (below 20° F), check lubrication order for proper lubricants and change if necessary. Drain coolant in radiator and replace with antifreeze to protect cooling system. Refer to table 2-1 for Military Antifreeze Materials.

h. Batteries are shipped dry. Fill batteries with electrolyte solution.

***Warning:* Do not smoke or use an open flame in the vicinity when servicing batteries. Batteries generate hydrogen, a highly explosive gas.**

i. Check torque of wheel nuts and tighten if

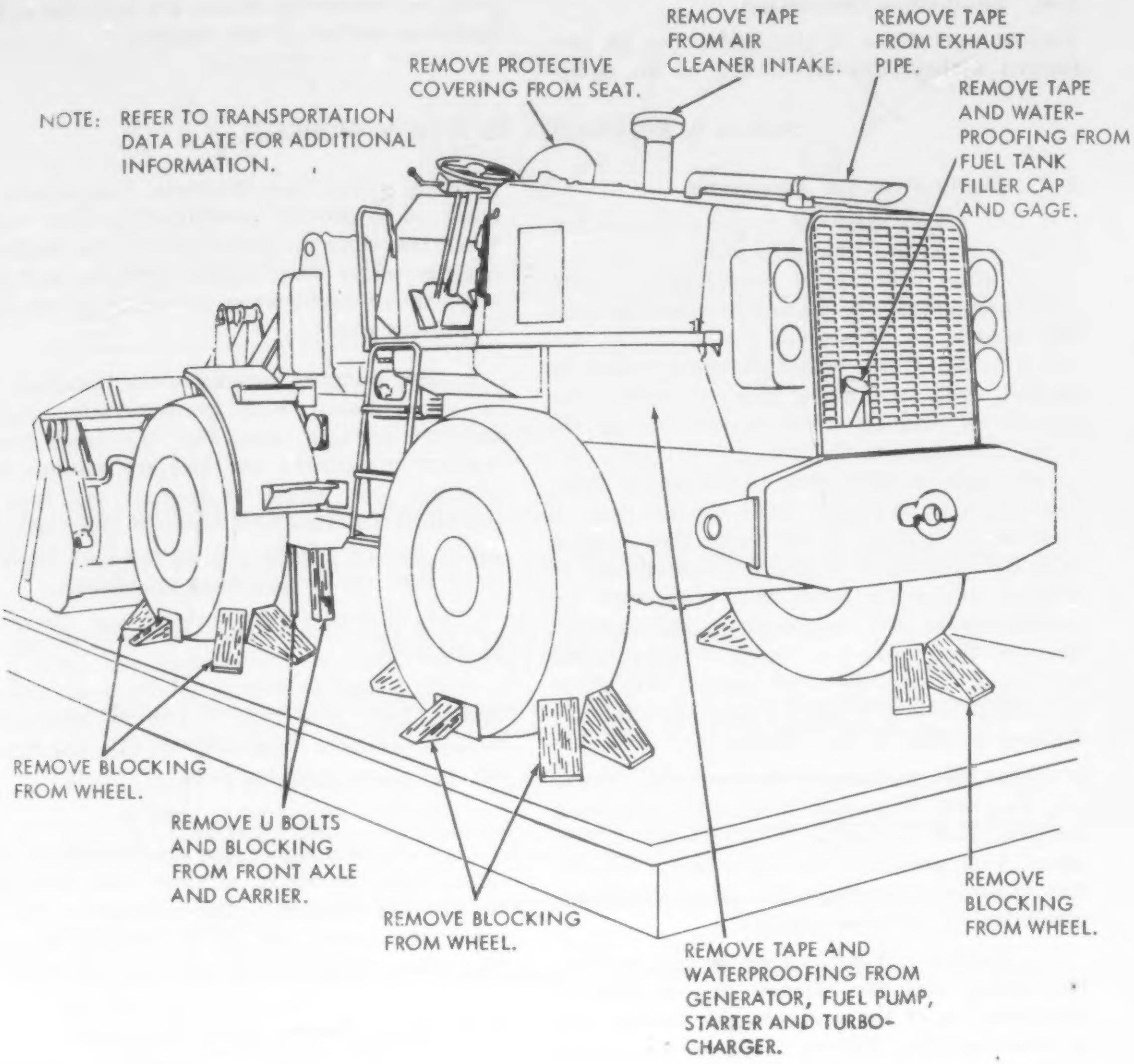

REMOVE TAPE FROM AIR CLEANER INTAKE.
REMOVE TAPE FROM EXHAUST PIPE.
REMOVE PROTECTIVE COVERING FROM SEAT.
REMOVE TAPE AND WATER-PROOFING FROM FUEL TANK FILLER CAP AND GAGE.
NOTE: REFER TO TRANSPORTATION DATA PLATE FOR ADDITIONAL INFORMATION.
REMOVE BLOCKING FROM WHEEL.
REMOVE U BOLTS AND BLOCKING FROM FRONT AXLE AND CARRIER.
REMOVE BLOCKING FROM WHEEL.
REMOVE BLOCKING FROM WHEEL.
REMOVE TAPE AND WATERPROOFING FROM GENERATOR, FUEL PUMP, STARTER AND TURBO-CHARGER.
MEC 3805-239-12/2-2

Figure 2-2. Scoop-type loader shipping and unloading details, left side view.

necessary. Tighten wheel nuts to proper torque, (365 to 400 foot pounds).

j. Check tire pressures and reduce, if necessary, to 45 psi.

2–4 Installation of Separately Packed Components

The unit is shipped completely assembled. No installation of separately packed components is necessary.

2–5. Installation or Setting-up Instructions

Remove safety locking bar, refer to figure 3–42.

2–6. Equipment Conversion

Various operations of the loader can be performed without any conversion of the equipment. All necessary details are included in the operation section of this chapter.

Section II. MOVEMENT TO A NEW WORKSITE

2–7. Dismantling for Movement

a. The loader does not require dismantling before moving to a new worksite.

Caution: **The loader should never, under any circumstances be pushed or towed to start the engine.**

(1) When the loader is being towed or pushed, with the drive line connected, the power flow from the loader wheels through the drive line and into the transmission and converter causes certain parts in the transmission and converter to rotate. Even though there is little or no load on these parts, they require sufficient lubrication to prevent damage due to friction and heat. Since the lubrication requirements of the transmission will not be fully satisfied while the loader is being towed or pushed, it is imperative that BOTH drive line shafts be disconnected when travel for any distance is done in this manner.

(2) The maximum distance the loader may be towed or pushed to a repair area with the drive lines connected is ½ mile and at low speed. Disregard for the above limits can result in serious damage to the transmission necessitating a complete overhaul.

Caution: **When towing or transporting the loader, seal the exhaust pipe to prevent auto-rotation of the turbocharger turbine due to wind velocity. Failure to do so may result in damage to the turbine bearing due to lack of lubrication.**

b. Movement of the loader to a new worksite can be accomplished by moving the loader over the road under its own power. Care should be observed to provide clearance for other traffic when traveling on public roads. The loader is slightly wider than normal vehicles and this must be consiered when traveling on two-lane or narrow roads.

c. Long distance moving of the loader should be accomplished with transportation equipment of suitable type. Flat bed truck-drawn trailers or railroad flat cars are suitable. Depending upon length of journey and type of terrain to be traversed, tiedown and block the loader securely. Before making a long distance move perform the following operations.

(1) Install safety locking bar. Refer to figure 3–42.

(2) Install protective covers on air cleaner intake, fuel filler cap, breathers, alternator, voltage regulator, hydraulic fill cap, and dump lift and clamp cylinder rods.

(3) Drain the cooling system.

(4) Place a tag on the steering wheel indicating that the above services have been performed and relating to the operator to remove protective covers, and safety locking bar, and fill cooling system before placing in operation.

2–8. Reinstallation After Movement

No reinstallation after movement is required. Depending on and type of movement, inspect and service loader as detailed in paragraph 2–3 if necessary. Refer to paragraph 2–5 and remove safety locking bar.

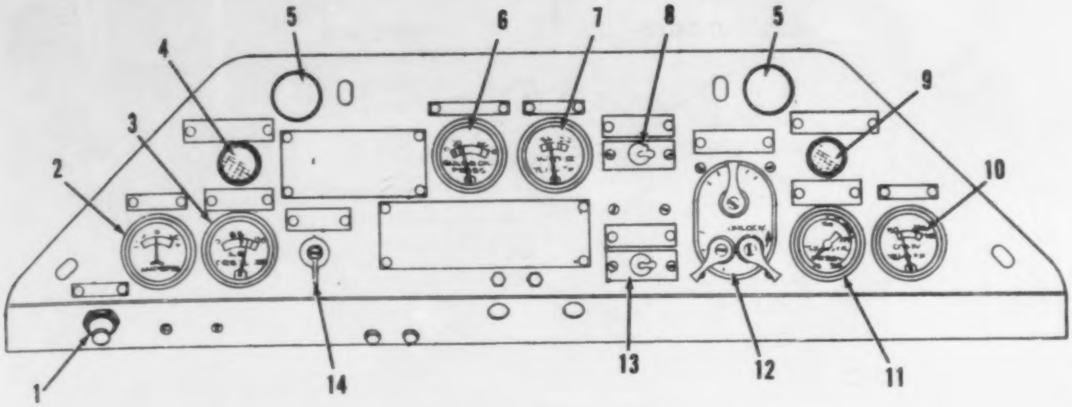
Section III. CONTROLS AND INSTRUMENTS

2–9. General

This section describes, locates, illustrates, and furnishes the operator, crew, and organizational maintenance personnel sufficient information about various controls and instruments for proper operation of the loader.

2–10. Controls and Instruments

The purpose of controls and instruments and their normal and maximum readings are illustrated on figure 2–3.



INSTRUMENT PANEL

1. HORN BUTTON. Depress button to sound vehicle horn.

2. AMMETER. Indicates charging rate of generator. Charging rate will fluctuate with condition of batteries and drain on electrical system.

3. AIR PRESSURE GAGE. Indicates amount of air pressure in brake system. Normal reading should be 75 to 125 psi. Warning light and buzzer signal if air pressure is too low.

4. AIR PRESSURE WARNING LIGHT. Operates when main switch is on. Light will come on and buzzer sound whenever air pressure is below 55 psi. If this occurs, stop loader and allow pressure to build up.

5. PANEL LIGHTS. Light comes on when vehicle lights are on to illuminate instrument panel for night operations.

6. ENGINE OIL PRESSURE GAGE. Indicates pressure in engine lubricating system. Normal operating range is 30 to 55 psi. When pressure is lower or higher than this range, stop engine and check cause.

7. ENGINE COOLANT TEMPERATURE GAGE. Indicates temperature of engine coolant. Normal operating range is 165 to 200°F.

8. AUXILIARY FLOODLIGHT SWITCH. Controls operation of auxiliary floodlight. Vehicle light switch must be on to operate floodlight.

9. CONVERTER TEMPERATURE WARNING LIGHT. Operates when main switch is on. Light will come on and buzzer will sound when temperature exceeds 250°F. If this occurs, stop loader and allow to cool.

10. CONVERTER TEMPERATURE GAGE. Indicates temperature of oil before it leaves converter. Normal operating range is 150 to 250°F.

11. TRANSMISSION OIL PRESSURE GAGE. Indicates pressure at which transmission clutches are operating. Normal operating range is 140 to 175 psi.

12. VEHICLE LIGHT SWITCH. Controls operation of vehicle lights. Refer to figure 2-3 ② for operation. Vehicle light switch must be on to operate.

13. FLOODLIGHT SWITCH. Controls operation of floodlights.

14. MASTER SWITCH. Controls vehicle electrical circuit to fuel pump, ammeter, generator, starter, and warning devices. Must be on to operate vehicle. Turning switch off stops the engine.

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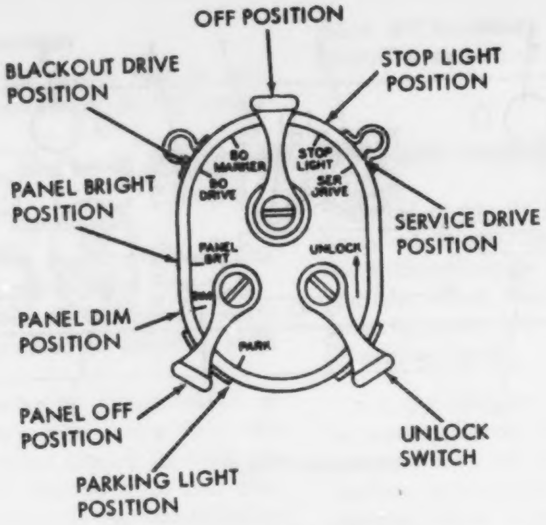
Figure 2-3①—Controls and instruments.



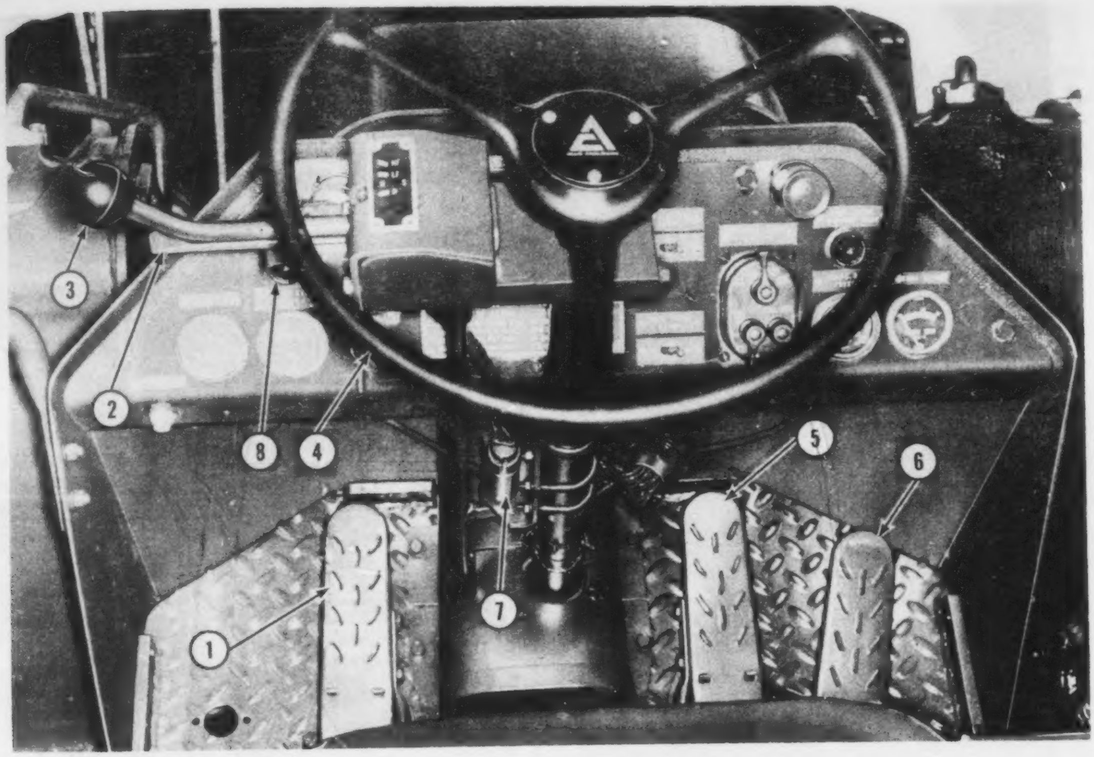
NOTE: TO PLACE SELECTOR SWITCH IN "SER DRIVE," LIFT UNLOCK SWITCH TO UNLOCK POSITION

1. PLACE UPPER LEVER IN BLACKOUT DRIVE POSITION TO OPERATE BLACKOUT HEAD AND TAILLIGHTS FOR BLACKOUT DRIVING.
2. PLACE UPPER LEVER IN OFF POSITION TO DEACTIVATE ALL VEHICLE LIGHTS.
3. PLACE UPPER LEVER IN STOP LIGHT POSITION TO OPERATE VEHICLE STOP LIGHTS, TURN SIGNAL LIGHTS, PARKING LIGHTS AND PANEL LIGHTS.
4. PLACE UPPER LEVER IN SERVICE DRIVE POSITION TO OPERATE VEHICLE NORMAL HEAD AND TAILLIGHTS AND SIGNAL LIGHTS.
5. PLACE LOWER LEVER IN POSITIONS INDICATED TO OPERATE PANEL LIGHTS AND PARKING LIGHTS.

NOTE: FLOODLIGHTS WILL OPERATE WHEN LEVER IS IN SERVICE DRIVE POSITION.

MEC 3805-239-12/2-3 ②

*Figure 2-3*②**—Continued.**



1. LEFT BRAKE PEDAL. Depress pedal to actuate vehicle service brakes and stop lights.

2. TURN SIGNAL SWITCH. Push switch lever upward to actuate right turn signal lights. Pull switch lever down to actuate left turn signal lights.

3. TRANSMISSION CONTROL LEVER. Controls operation of transmission. Lever has four positions. Move lever forward to first notch (LF) to operate loader forward in low range. Move lever all the way forward (HF) to operate loader in a forward direction in high range. Move lever all the way to the rear (R) to operate loader in a reverse direction. Place lever in center position (N) to place transmission in neutral. To operate engine starter, place lever in neutral position and lift up toward steering wheel (S) to actuate neutral start switch (7).

4. STEERING WHEEL. Controls turning of loader. Turn wheel to left to turn front section to left; turn wheel to right to turn front section to right.

5. RIGHT BRAKE PEDAL. Depress pedal to actuate vehicle service brakes and stop lights. Operates same as left brake pedal.

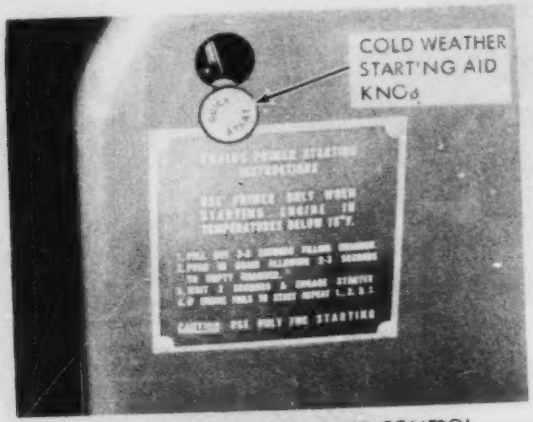
6. ACCELERATOR. Controls speed of engine. Depress accelerator to increase speed, release to decrease speed.

7. NEUTRAL START SWITCH. Closes circuit to auxiliary solenoid when actuated by transmission control lever.

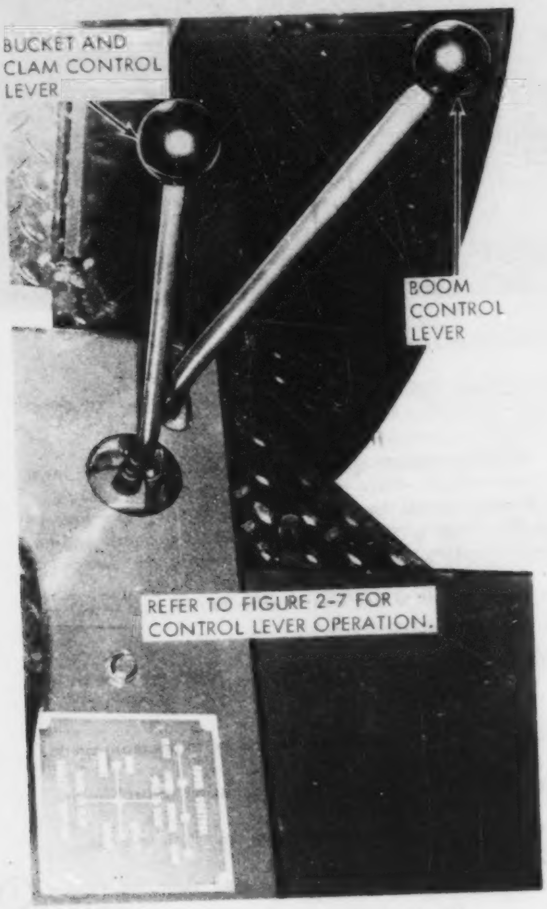
8. FLASHER LEVER. Pull lever out to operate front and rear turn signal lights simultaneously. Push lever in to return to normal operation.

MEC 3805-239-12 2-3 ③

Figure 2-3. Controls and instruments (cont'd).

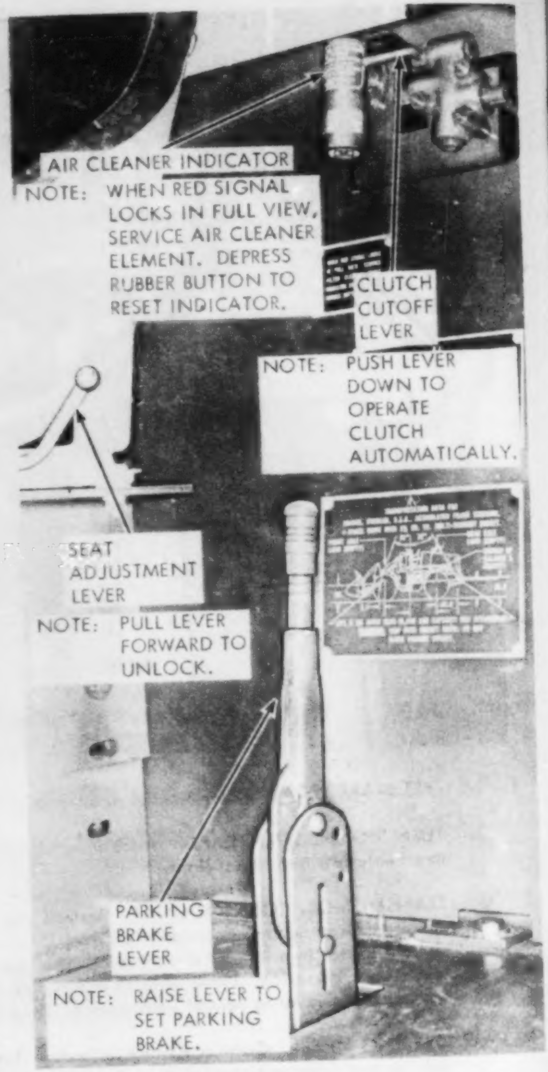


COLD WEATHER STARTING AID CONTROL



REFER TO FIGURE 2-7 FOR CONTROL LEVER OPERATION.

BOOM AND BUCKET CONTROL LEVERS



NOTE: WHEN RED SIGNAL LOCKS IN FULL VIEW, SERVICE AIR CLEANER ELEMENT. DEPRESS RUBBER BUTTON TO RESET INDICATOR.

NOTE: PUSH LEVER DOWN TO OPERATE CLUTCH AUTOMATICALLY.

NOTE: PULL LEVER FORWARD TO UNLOCK.

NOTE: RAISE LEVER TO SET PARKING BRAKE.

SEAT ADJUSTMENT LEVER
AIR CLEANER INDICATOR
CLUTCH CUTOFF LEVER
PARKING BRAKE LEVER

MEC 3805-239-12/2-3 ④

Figure 2-3. Controls and instruments (cont'd).

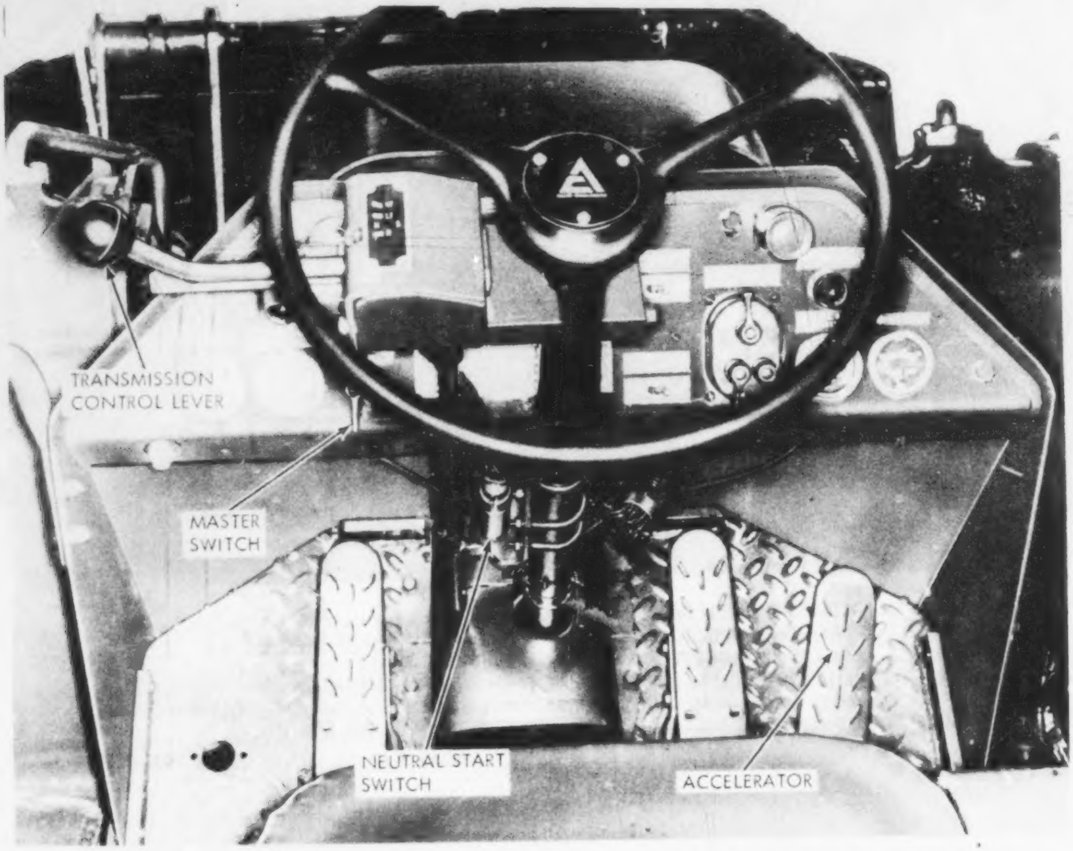
Section IV. OPERATION OF EQUIPMENT

2-11. General

a. Instructions in this section are published for information and guidance of personnel responsible for operation of the scoop-type loader.

Note. Left and right sides of the loader are determined by sitting in the operator's seat and facing the steering wheel.

b. The operator must know how to perform



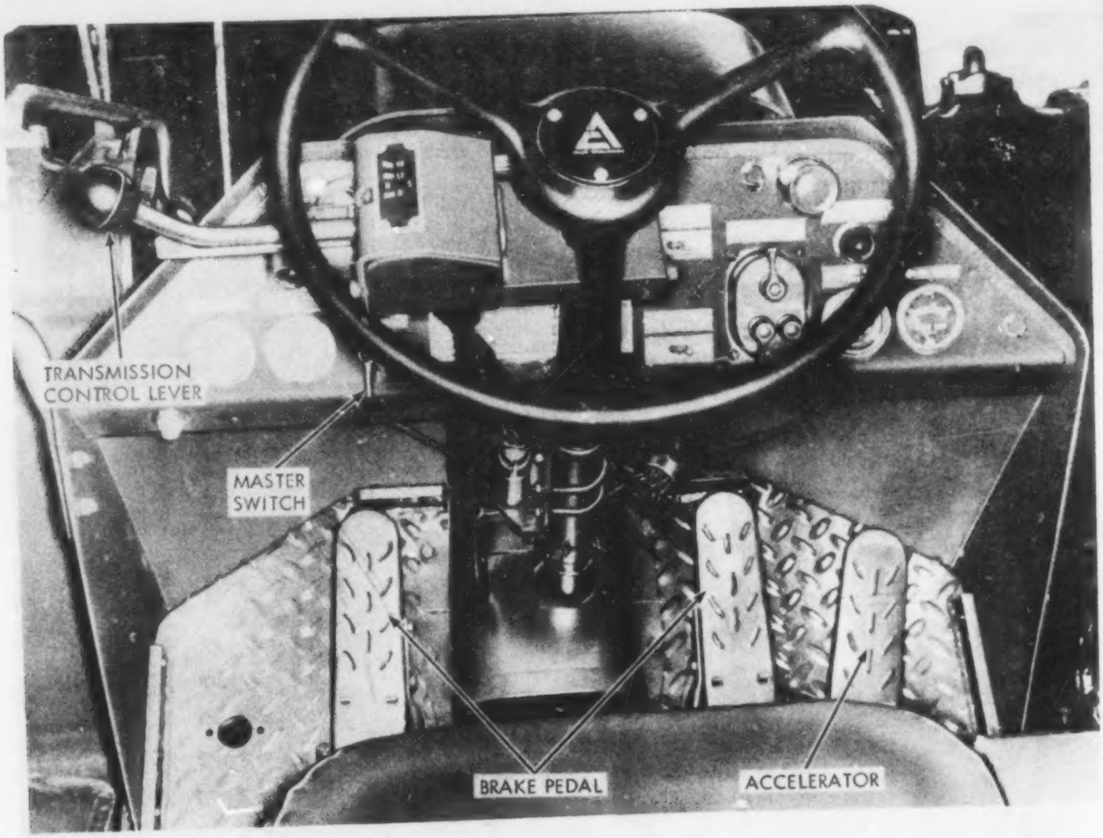
NOTE: TRANSMISSION CONTROL LEVER AUTOMATICALLY RETURNS TO NEUTRAL WHEN PARKING BRAKE IS SET.

STEP 1. RAISE PARKING BRAKE LEVER (FIG. 2-3) TO SET PARKING BRAKE.
STEP 2. TURN MASTER SWITCH TO ON POSITION.
STEP 3. DEPRESS ACCELERATOR ALL THE WAY DOWN.
STEP 4. RAISE TRANSMISSION CONTROL LEVER INTO NEUTRAL START NOTCH TO ACTUATE STARTER.
STEP 5. RELEASE TRANSMISSION CONTROL LEVER AFTER ENGINE STARTS.
STEP 6. RELEASE ACCELERATOR AND ALLOW ENGINE TO OPERATE A FEW MINUTES TO REACH OPERATING TEMPERATURE.
STEP 7. CHECK ALL CONTROLS AND INSTRUMENTS FOR PROPER OPERATION.

CAUTION: DO NOT TOW OR PUSH LOADER TO START ENGINE.

MEC 3805-239-12/2-4

Figure 2-4. Starting the loader.



STEP 1. DEPRESS BRAKE PEDAL TO STOP LOADER.
STEP 2. PLACE TRANSMISSION CONTROL LEVER IN NEUTRAL POSITION.
STEP 3. RAISE PARKING BRAKE LEVER TO SET PARKING BRAKE.
STEP 4. RELEASE ACCELERATOR AND ALLOW ENGINE TO OPERATE AT IDLE SPEED FOR THREE OR FOUR MINUTES TO GRADUALLY COOL ENGINE AND TRANSMISSION.
STEP 5. TURN MASTER SWITCH TO OFF POSITION TO STOP THE ENGINE.

MEC 3805-239-12/2-5

Figure 2-5. Stopping the loader.

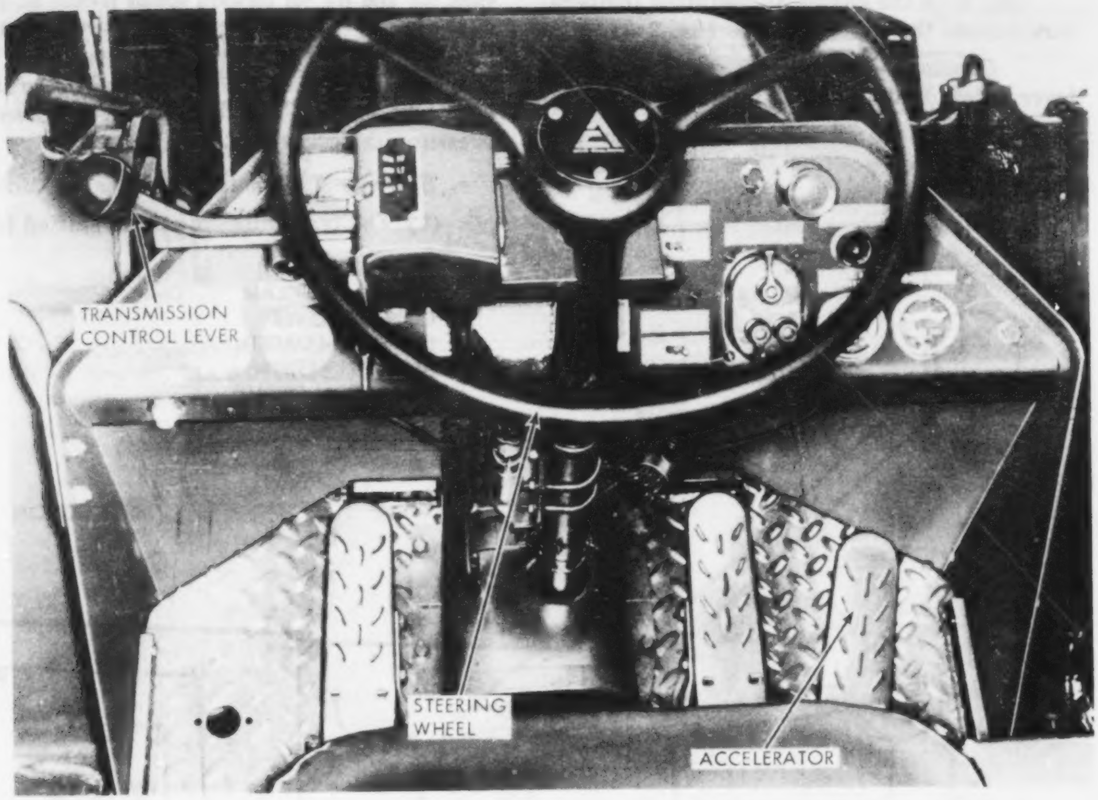
every operation of which the loader is capable. This section gives information on starting and stopping the loader, basic motions of the loader, and on coordinating basic motions to perform specific tasks for which the equipment is designed. Since nearly every job presents a different problem, the operator may have to vary given procedures to fit the individual job.

2-12. Starting

a. Preparation for Starting. Perform the necessary daily preventive maintenance services (para 3-6).

b. Starting. Refer to figure 2-4 and start the loader. Allow engine to warm up at fast idle speed until it reaches operating temperature (160° to 200° F).

Warning: **Do not operate the loader inside unless in a well ventilated area. Inhalation of exhaust fumes will result in serious illness or death.**



STEP 1. RELEASE PARKING BRAKE BY PUSHING LEVER DOWN.
STEP 2. MOVE BOOM CONTROL LEVER (FIG. 2-7) TO REAR AND RAISE BUCKET OFF GROUND.
STEP 3. PUSH CUT-OFF VALVE LEVER (FIG. 2-3) DOWN TO OPERATE CLUTCH CUT-OFF.
STEP 4. PLACE TRANSMISSION CONTROL LEVER IN POSITION REQUIRED FOR RANGE AND DIRECTION OF TRAVEL.
STEP 5. DEPRESS ACCELERATOR TO START LOADER IN MOTION AND REGULATE SPEED BY PRESSURE ON ACCELERATOR.

MEC 3805-239-12/2-6

Figure 2-6. Placing loader in motion.

2-13. Stopping

a. Steer loader to bring sections in line with each other. Lower bucket to ground.

***Warning:* Always lower bucket to ground when loader is not in use or before servicing loader.**

b. Refer to figure 2-5 and stop the loader.

c. Perform the necessary daily preventive maintenance services (para 3-6).

2-14. Operation Under Usual Conditions

a. Start the Loader. Refer to paragraph 2-12 and start the loader.

b. Placing Loader in Motion.

(1) Move boom control lever (fig. 2-7) to the rear and raise bucket about 12 inches from ground.

(2) Push clutch cut-off valve lever (fig. 2-3) down to operate clutch cut-off if desired. When lever is in down position and brake pedal is depressed, transmission output to drive axles is stopped. This allows the operator to make faster stops and provide easier shifting while working back and forth during loading and unloading operations.

(3) With the engine at operating temperature release the parking brake (fig. 2–3).

***Caution:* Do not move clutch cut-out lever unless brake pedal is fully released.**

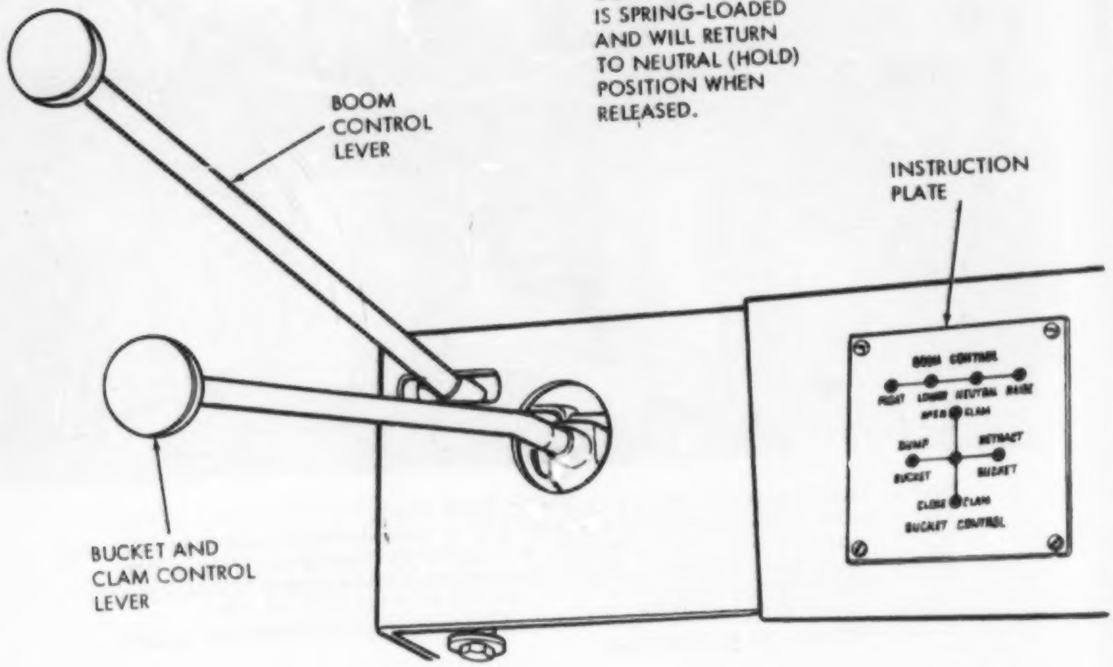
(4) Move transmission control lever (fig. 2–6) to required position for range and direction.

Note. Transmission control lever has three positions. LF and HF for forward speeds toward the front of the loader and R for reverse direction toward the rear of the loader.

(5) Depress accelerator (fig. 2–6) to start loader in motion. Regulate speed of travel by pressure on accelerator.

c. Shifting Transmission while in Motion.

(1) The transmission can be shifted from



NOTE: BUCKET AND CLAM CONTROL LEVER IS SPRING-LOADED AND WILL RETURN TO NEUTRAL (HOLD) POSITION WHEN RELEASED.

BOOM OPERATION:

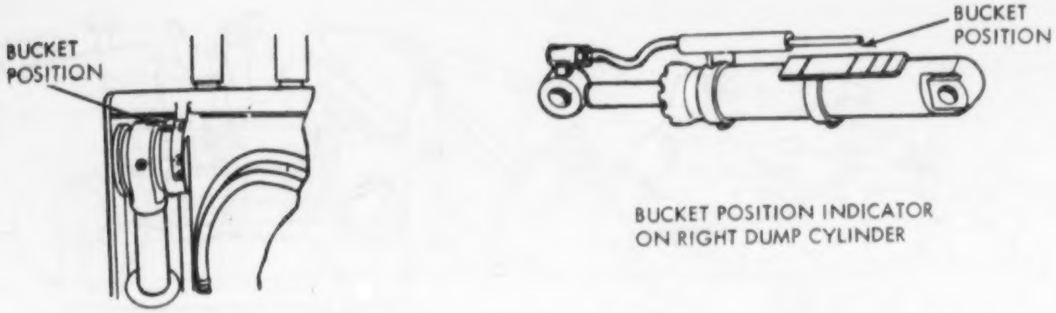
STEP 1. MOVE BOOM CONTROL LEVER FORWARD TO LOWER BUCKET.
STEP 2. MOVE BOOM CONTROL LEVER ALL THE WAY FORWARD TO PLACE BOOM CONTROLS IN FLOAT POSITION.
STEP 3. PLACE BOOM CONTROL LEVER IN FIRST REAR DETENT FOR NEUTRAL POSITION.
STEP 4. MOVE BOOM CONTROL LEVER ALL THE WAY TO THE REAR TO RAISE BUCKET.

BUCKET OPERATION:

STEP 1. MOVE LEVER FORWARD TO DUMP BUCKET.
STEP 2. MOVE LEVER STRAIGHT BACK TO CLOSE BUCKET.
STEP 3. MOVE LEVER TO LEFT NOTCH TO CLOSE CLAM.
STEP 4. MOVE LEVER TO RIGHT NOTCH TO OPEN CLAM.

MEC 3805-239-12/2-7

Figure 2–7. Bucket and clam control lever and boom control lever.



BUCKET POSITION INDICATOR ON RIGHT DUMP CYLINDER

CLAM POSITION INDICATOR ON LEFT CLAM CYLINDER

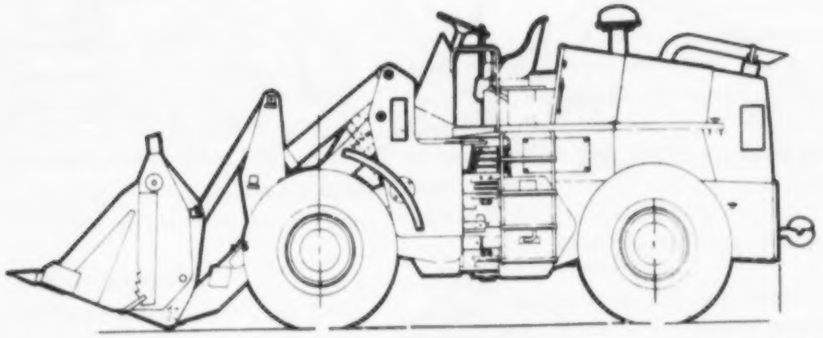


Figure 2–8. Clam positioned for bucket operation.

low to high (LF and HF positions) while the loader is in motion and at full throttle.

***Caution:* Do not downshift from high range to low range at speeds in excess of 5 mph.**

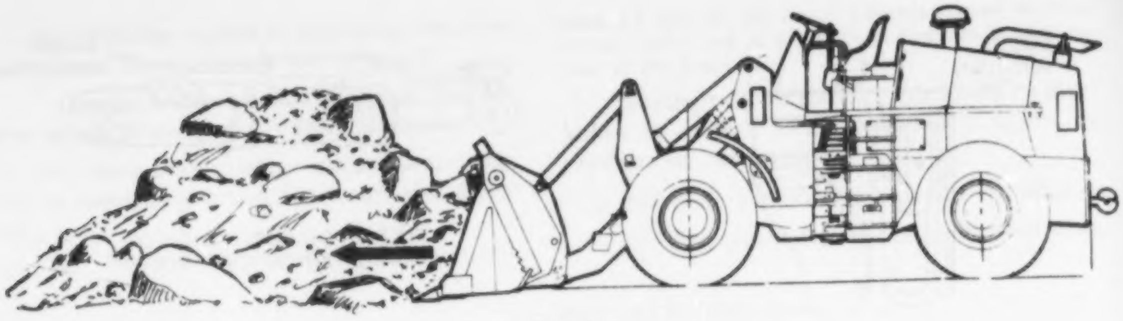
(2) To change direction (forward to reverse or reverse to forward) release the accelerator and depress brake to decrease engine speed and stop loader before moving transmission control lever.

(3) Always operate the loader in a speed range that will permit engine to operate at full speed.

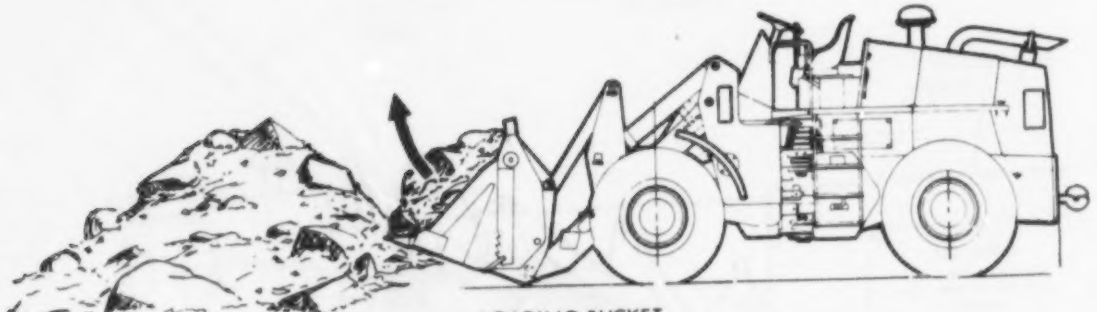
d. Steering. Steer the loader by turning the steering wheel (fig. 2–6) in the direction of the turn desired. Hydraulic cylinders pivot the front end of the loader in direction of the turn. Hold steering wheel in turn position until turn is completed. Rear wheels will track front wheels in the turn. To bring front end of loader in line with rear after completion of the turn, rotate steering wheel in the opposite direction until the two sections are in line.

e. Bucket Operation.

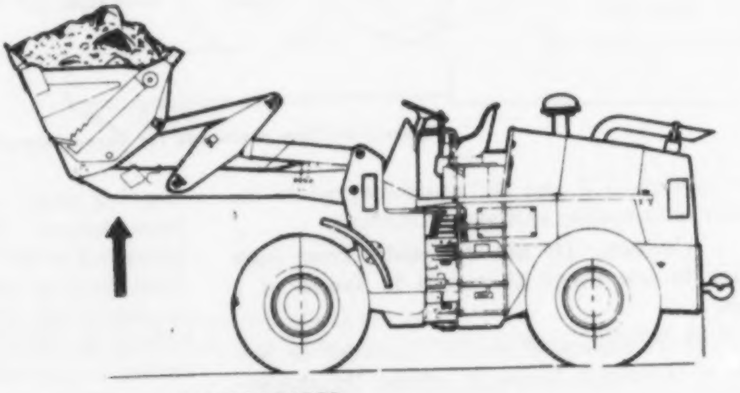
(1) *General.* The multi-purpose bucket consists of a moldboard, a pivoted clam, and two hydraulic cylinders to operate the clam. Included in the hydraulic system is an overload



APPROACH



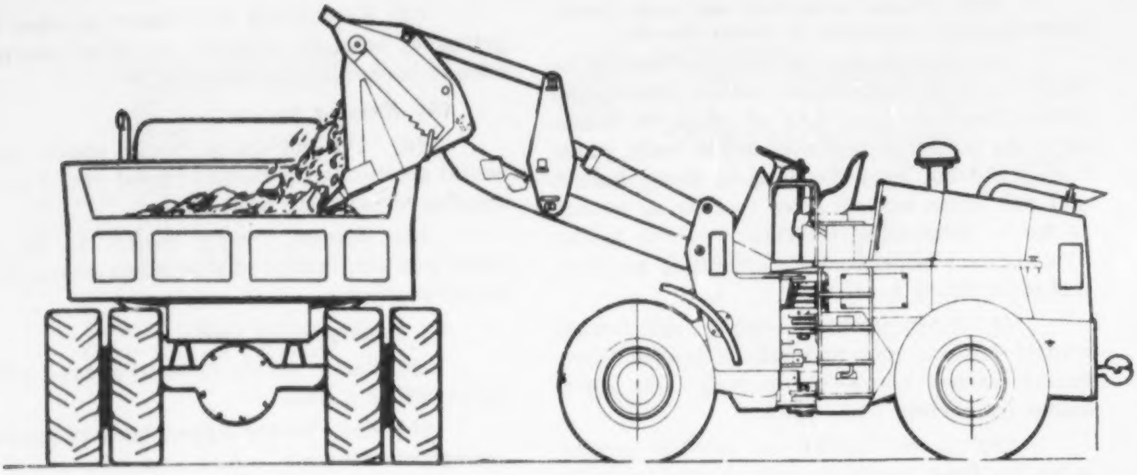
LOADING BUCKET



BUCKET LOADED

MEC 3805-239-12/2-9

Figure 2-9. Loading bucket.



MEC 3805-239-12/2-10

Figure 2-10. Dumping into truck body.

relief valve, located, on the rear of the bucket, to protect the front end of the clam against shock loads while in the open position. Bucket operation is controlled by the bucket and clam control lever and boom control lever (fig. 2-7).

Note. Before attempting to operate the bucket the engine should be running at operating temperature (para 2-12).

(2) *Normal loader operation.*

(*a*) Move bucket control lever (fig. 2-7) to left to close clam and operate as a scoop-type loader as shown in figure 2-8.

Note. The left clam cylinder has an indicator (fig. 2-8) which shows position of clam. Close clam to bring indicator to BUCKET position as shown in figure 2-8.

(*b*) The bucket has the correct digging angle when the bucket is tilted forward with the cutting edge resting flat on the ground.

(*c*) Raise bucket by pulling boom control lever (fig. 2-7) to the rear. Drive loader to material to be loaded. Push boom control lever forward to lower bucket to ground or material and place boom control lever in hold position.

(*d*) Adjust bucket angle, using bucket control lever (fig. 2-7) to bring cutting edge flat on ground.

(*e*) With bucket at angle required for most efficient loading, drive loader into material (use low range of transmission for sufficient power during loading). To increase depth of penetration and apply down pressure, move boom control lever (fig. 2-7) forward as bucket enters material.

Note. Boom control lever has four positions as indicated on figure 2-7.

(*f*) Continue driving loader into stockpile to load bucket. If loader begins to stall, touch brake pedal (fig. 2-6) lightly and at same time move bucket control lever to rear to tip bucket back slightly to decrease penetration angle.

Note. Keep accelerator fully depressed during entire loading cycle.

(*g*) Continue moving loader forward and at the same time raising boom (pulling boom control lever to rear) and retract bucket (pulling bucket control lever to rear) as it fills. After bucket is loaded and retracted (fig. 2-9) lift boom to bring bucket to travel position.

(*h*) Place boom control lever in neutral or hold position (fig. 2-7). Move transmission control lever to reverse position and back loader from material.

Note. **Release accelerator and apply brakes before shifting transmission to change direction.**

(*i*) Drive loader to dumping area or to truck to be loaded. Raise bucket with boom control lever to clear side of truck, if necessary. As bucket moves over truck body, move bucket control lever forward to dump bucket and pull boom control lever to rear to retract bucket at same time. Continue to move loader forward slowly as bucket is emptied as illustrated on figure 2–10.

(*j*) When bucket is empty, pull bucket control lever to rear and retract bucket. Keep bucket raised above truck body and move loader back away from truck.

(*k*) Lower bucket by moving control lever to float position until bucket reaches travel level while returning to stockpile to load bucket as described above.

(3) *Loading hard material.*

(*a*)) Approach material as described above.

(*b*) As bucket penetrates material, place boom control lever (fig. 2–7) in float position. Move bucket control lever (fig. 2–7) back and forth between dump and retract positions to agitate bucket while moving loader forward.

(*c*) Agitation of bucket should loosen material. As bucket loosens material, operate boom control lever to raise bucket and bucket control lever to retract bucket as it fills.

(*d*) When bucket is filled, retract and raise bucket and transport material to loading or dumping area.

(4) *Truck loading.*

(*a*) When truck loading from a stockpile, park truck at 90° to pile with body of truck toward pile.

(*b*) Approach pile with loader at 45° to pile and truck. With bucket approximately 10 to 12 feet from side of truck, turn loader into pile and load bucket.

(*c*) With bucket loaded, back loader from pile at approximately same angle as entry. When bucket clears pile, apply brakes, shift to forward low range and depress accelerator, at same time turning loader toward truck. Move loader to truck and dump load as described above.

(*d*) Keep truck and loader as close together as possible, without providing interference to bucket lifting operation.

(5) *Raising bucket.*

(*a*) Do not raise boom above horizontal position with bucket tipped over beyond digging or carrying position.

(*b*) Always return bucket to dig or carry position before raising boom above horizontal position.

(6) *Transporting load.*

(*a*) Carry bucket close to ground when transporting a load.

(*b*) Keep bucket tipped back to prevent spillage of material.

(*c*) Carrying bucket close to ground when loaded provides best overall balance to the loader.

f. Bulldozing.

(1) *Operation.*

(*a*) Move boom control lever (fig. 2–7) forward and position bucket on ground. Move bucket control lever (fig. 2–7) to move bucket level indicator to position shown in figure 2–11.

(*b*) Move bucket control lever (fig. 2–7) forward and open clam to position shown in figure 2–11.

(*c*) With bucket in bulldozing position, operate the vehicle as a bulldozer by placing loader in motion (*b* above).

(*d*) Push material with bucket. When bulldozing, a trench is usually formed from material spilled on either side of the bucket. If possible, work the loader in the trench for maximum possible loads.

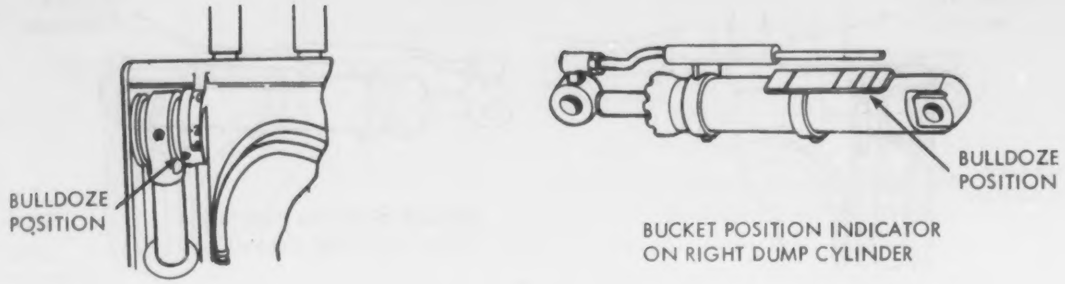
(*e*) When removing brush and small trees, lower the cutting edge into ground enough to strike and cut the roots.

(*f*) When removing somewhat heavier trees, raise bucket to higher position to gain leverage and push tree to ground. Lower bucket to ground and cut the roots.

(2) *Bucket adjustment.*

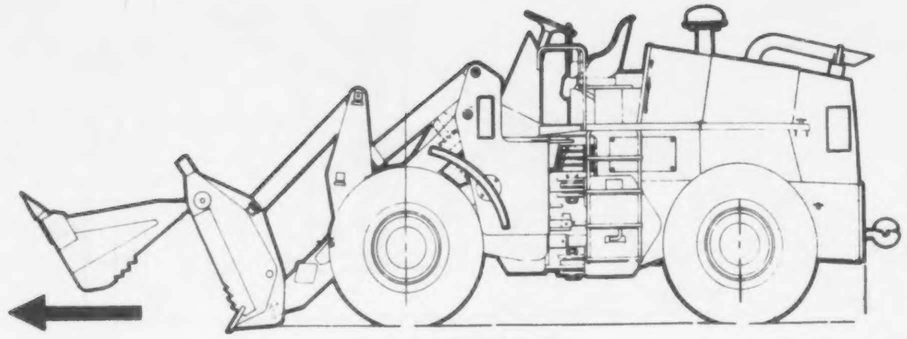
(*a*) Digging angle of bucket moldboard can be increased by tilting bucket forward with the bucket control lever (fig. 2–7). Push lever forward for deeper digging.

(*b*) To decrease digging angle of bucket



BUCKET POSITION INDICATOR ON RIGHT DUMP CYLINDER

CLAM POSITION INDICATOR ON LEFT CLAM CYLINDER



BULLDOZING POSITION

MEC 3805-239-12/2-11

Figure 2-11. Clam positioned for bulldozing operation.

moldboard, move bucket control lever to rear to raise cutting edge of moldboard.

g. Scraping.

(1) *Operation.*

(*a*) Move boom control lever (fig. 2-7) forward to position bucket on ground. Move bucket control lever (fig. 2-7) to move bucket level indicator to position shown on figure 2-12.

(*b*) Move bucket control lever (fig. 2-7) to the right, open clam to position shown in figure 2-12.

(*c*) With bucket in scraping position, operate the loader as a scraper by placing the vehicle in motion ((*b*) above).

(*d*) The position as shown will allow a two inch scraper cut.

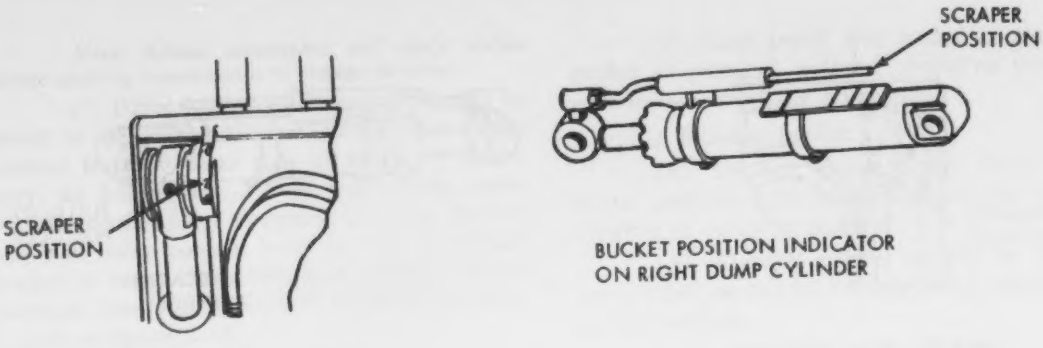
(2) *Scraper adjustment.*

(*a*) If a deeper scraper cut is required, operate boom control lever (fig. 2-7) to lower bucket.

(*b*) To decrease scraper cut, operate bucket control lever to raise bucket as required.

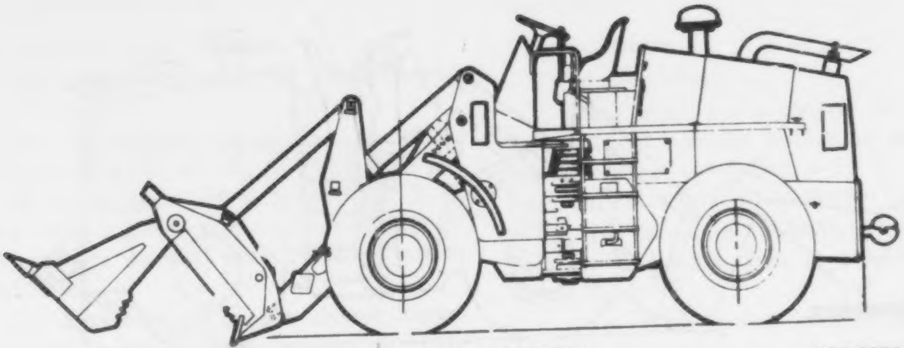
h. Clam Shell Operation.

(1) Move boom control lever (fig. 2-7) to



CLAM POSITION INDICATOR ON LEFT CLAM CYLINDER

BUCKET POSITION INDICATOR ON RIGHT DUMP CYLINDER



SCRAPING POSITION

MEC 3805-239-12/2-12

Figure 2-12. Clam positioned for scraping operation.

raise bucket off the ground. Move bucket control lever (fig. 2-7) to move bucket level indicator to position shown on figure 2-13.

(2) Move bucket control lever (fig. 2-7) to position clam in the fully open position as shown in figure 2-13.

(3) Move loader ((*b*) above) to material.

(4) Operate boom control lever to raise bucket high enough to suspend over material to be loaded.

(5) With clam open, move boom control lever to lower bucket into material.

(6) Move bucket control lever (fig. 2-7) to close clam and fill bucket.

(7) Move boom control lever to rear to raise bucket and clear material.

(8) Keep bucket closed and move loader to truck or dumping area.

(9) Raise bucket with boom control lever, if necessary, to clear truck sides or stockpile.

(10) Move bucket control lever and open clam and release material.

(11) Raise bucket and return to stockpile for another load.

2-15. Operation in Extreme Cold (Below 0°F)

a. General. If the loader is to be operated in extreme cold weather temperatures, certain

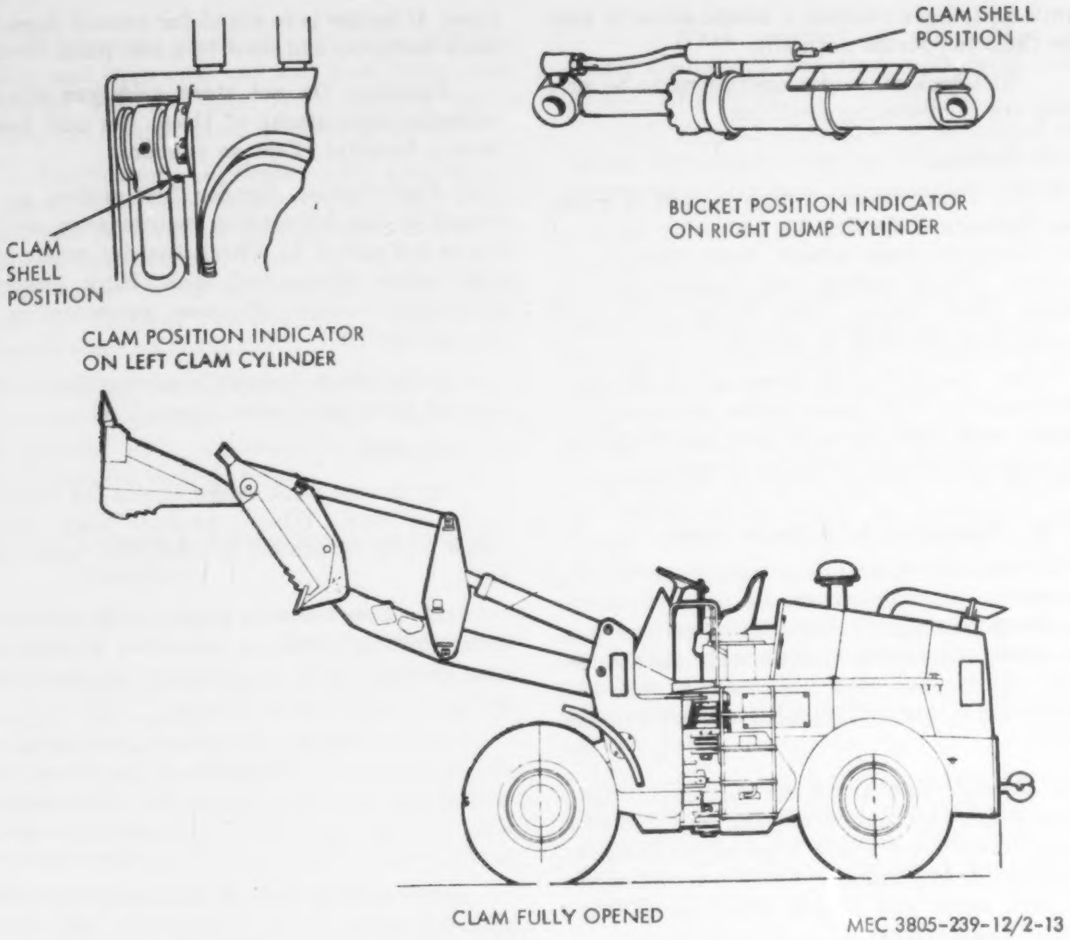

CLAM SHELL POSITION
BUCKET POSITION INDICATOR ON RIGHT DUMP CYLINDER
CLAM SHELL POSITION
CLAM POSITION INDICATOR ON LEFT CLAM CYLINDER
CLAM FULLY OPENED
MEC 3805-239-12/2-13

Figure 2-13. Clam fully open.

precautions must be taken to assure continued normal operation. The following paragraphs detail checks to be made to be certain the loader is capable of operating at these temperatures.

b. Cooling System. Check cooling system for correct antifreeze solution for lowest temperature expected (table 2-1). Carefully inspect cooling system and correct or report any leaks.

c. Batteries. Keep batteries fully charged to prevent freezing. If water is added to batteries, run engine at least one hour to mix electrolyte solution.

d. Fuel System. Keep fuel tank full at all times. Drain condensation from tank before and after operation. Drain and service fuel filter (para 3-9).

e. Lubrication. Lubricate entire loader according to current lubrication order.

f. Operation. Start engine (para 2-12) and allow it to reach normal operating temperature before applying load.

(1) If mud or snow collects and freezes on any of the moving parts while loader is idle, apply heat to thaw the frozen material before attempting to operate loader.

(2) Operate hydraulic units with care

until units have reached a temperature to enable them to operate normally.

(3) Check all loader operations to be sure they are in operating condition.

g. Parking.

(1) Park loader on high ground if possible. Prepare a footing of planks or brush if necessary to keep wheels from freezing in ground. Chock wheels and release parking brake. Place blocks under bucket to prevent bucket from freezing to ground.

(2) Clean all mud, snow, and ice to prevent freezing. Park loader under cover or cover loader with a tarpaulin if possible. Keep ends of tarpaulin from freezing to ground.

2-16. Operation in Extreme Heat

a. General. Continuous operation of the loader in high temperatures may cause the loader to overheat. Avoid continuous low gear operation if possible. Continuously observe engine and transmission temperatures and halt loader for a cooling-off period whenever necessary.

b. Cooling System. Make frequent inspections and servicings of the fan and radiator. Keep coolant level 1 inch from top of radiator. Check grille and radiator fins for accumulation of dust, sand, and insects which could block the cooling passages.

(1) Formation of scale and rust in the cooling system occurs more rapidly in extremely high temperatures. Change antifreeze each year to keep corrosion inhibitor at full strength.

(2) If necessary, flush cooling system periodically to keep passages clear. Avoid use of water with a high alkali content which increases scale and rust formations.

c. Batteries. Check level of electrolyte daily. Keep electrolyte above plates to prevent damage to batteries. Use a slightly weaker electrolyte solution in hot climates. Dilute 1.280 specific gravity electrolyte as issued to 1.200 to 1.240 specific gravity reading at full charge. Recharge batteries at 1.160 specific gravity. Batteries self-discharge at a higher rate if left standing for long periods at high temperatures. If loader is to stand for several days, remove batteries and store in a cool place.

***Caution:* Do not store acid-type storage batteries near stacks of tires; the acid fumes have a harmful effect on rubber.**

d. Fuel System. Service fuel system as directed in the preventive maintenance section (para 3-6 and 3-7). Check fuel for water content before filling fuel tank. High temperatures and cooling off cause condensation in storage drums.

e. Lubrication. Lubricate as specified in the current lubrication order (para 3-4).

f. Parking.

(1) Do not park loader in sun for long periods of time. When practical park loader under cover to protect it from sun, sand, and dust.

(2) Cover inactive loader with tarpaulins if no suitable shelter is available. Protect engine compartment, transmission, and hydraulic pumps from entrance of sand.

(3) In hot, damp climates, corrosive action will occur on all parts of the loader and will be accelerated during the rainy season. Rust and paint blisters will appear on metal surfaces and fungus growth on other surfaces.

(4) Protect all unfinished exposed metal surfaces with a film of preservative lubricating oil, medium (PL medium). Protect cables and terminals with ignition-insulation compound (MIL-I-13811). Apply paint or suitable rust preventive to damaged surfaces to protect from rust and corrosion.

2-17. Operation in Dusty or Sandy Areas

a. General. Operation of the loader may cause dust in almost any area. However, when operating in predominantly dusty or sandy areas additional precautions must be taken.

b. Cooling System. Keep cooling system fins and cooling areas clean. Blow out with compressed air, if possible, as often as necessary.

c. Fuel System. Use care when servicing fuel system to prevent dust and sand from entering the tank or filters.

d. Air System. Service the air cleaner at frequent intervals, check air restriction indicator daily and keep dust cup and dust valve clean. Prevent dust and sand from entering engine parts and compartment as much as possible.

e. Lubrication. Lubricate loader according to current lubrication order (para 3-4). Lubricate and perform services at much shorter intervals than normal. Clean all lubrication fittings before applying lubricant. Sand mixed with a lubricant becomes very abrasive and speeds wear on parts.

f. Parking. Protect loader from dust and sand as much as possible. Park loader under cover or protect with tarpaulins to keep dust and dirt from damaging loader.

2-18. Operation Under Rainy or Humid Conditions

a. General. Operation under rainy or humid conditions is similar to that in extreme heat.

b. Preservation. Keep all exposed surfaces coated with preservative lubricating oil (PL medium). Pay particular attention to damaged painted surfaces. Cover all paint cracks and chip marks as soon as possible to prevent corrosive effects.

2-19. Operation in Salt Water Areas

a. General. The corrosive effect of salt water and salt water spray is very extensive. When operating in salt water areas, observe the following precautions.

b. Preservation.

(1) When exposed to salt water, dry loader thoroughly and rinse with fresh water as soon as possible.

(2) Keep all exposed surfaces coated with preservative lubricating oil (PL medium). Pay particular attention to damaged paint surfaces.

(3) Keep all painted surfaces in good repair.

(4) Lubricate loader as prescribed in current lubrication order (para 3-4). Shorten lubricating intervals for parts subject to exposure to salt water.

2-20. Operation at High Altitudes

a. General. Normally, operation of the loader at high altitudes will be as outlined in paragraph 2-15, operation in extreme cold. Before operating engine at points above 8000 feet, engine fuel input must be reduced to avoid overspeeding of the turbocharger and to maintain exhaust temperatures within permissible limits. The following points should be checked in addition to those listed in paragraph 2-15.

b. Cooling System. Check engine operating temperature for evidence of overheating. The pressure cap on the radiator must make a perfect seal to maintain coolant pressure in the system.

c. Air System. The operation efficiency of the loader engine should not be affected. An exhaust driven turbocharger on the engine will maintain a sufficient supply of air for the cylinders.

Section V. OPERATION OF AUXILIARY MATERIAL USED IN CONJUNCTION WITH THE EQUIPMENT

2-21. General

a. Auxiliary equipment used in conjunction with the equipment consists of a dry-type fire extinguisher and a cold weather starting aid.

b. The fire extinguisher is mounted on brackets in the operator's compartment.

c. The cold weather starting aid is mounted at the left front of the engine compartment. Control of the starting aid (fig. 2-3) is supplied by the operator pulling a knob. The knob is connected to a cable which, when pulled, opens a valve and injects a highly volatile fuel into the intake manifold. This fuel aids in starting the engine in cold weather.

2-22. Fire Extinguisher

a. Description. The dry chemical type fire extinguisher is suitable for use on all types of fire and is effective in areas where ambient temperature is −25 °F and above. If winterized (pressurized with nitrogen), the fire extinguisher may be used in temperatures below −25 °F. The fire extinguisher is a 2½ pound, stored pressure, lever-operated extinguisher.

b. Operation. Remove the fire extinguisher from its location, lift the handle, press lever, and direct the powder at the base of the flame using a side-to-side sweeping motion.

c. Maintenance. Weigh the fire extinguisher every 6 months and replace the extinguisher if weight is less than 2½ pounds, or if pressure is below 125 pounds. Refer to TB 5-4200-200-10. The dry chemical fire extinguishers will be serviced at installation level through repair and utilities facilities, with the filling agent supplied by local procurement through troop supply channels.

2-23. Cold Weather Starting Aid

a. General. The cold weather starting aid consists of a cylinder (fig. 3-23) filled with ether, a valve, a tube and injector connecting the valve to the intake manifold, and a control cable and knob (fig. 2-3). Pulling the knob opens the valve and the gas flows to the manifold from where it is drawn into the cylinders.

b. Operation. Refer to figure 2-3 for operation of the cold weather starting aid.

(1) Pull knob (fig. 2-3) for 2 to 3 seconds to fill chamber.

Note. **Use starting aid only when starting engine in temperatures below 15°F.**

(2) Push knob in again to empty chamber into manifold.

(3) Wait 3 seconds and engage starter.

(4) If engine fails to start repeat steps 1 through 3.

Caution: **Use the starting aid only for starting engine.**

c. Service. Refer to paragraph 3-49 to service the starting aid.

Warning: **When the loader is to be used in a warm climate or one where there is no danger of extreme cold weather, remove the starting aid cylinder (fig. 3-23). This will prevent inadvertent injection of the fluid and possible damage to engine.**

CHAPTER 3

OPERATOR AND ORGANIZATIONAL MAINTENANCE INSTRUCTIONS

Section I. OPERATOR AND ORGANIZATIONAL MAINTENANCE TOOLS AND EQUIPMENT

3–1. Special Tools and Equipment

No special tools and equipment are required by operator or organizational maintenance personnel for maintenance of the loader.

3–2. Basic Issue Tools and Equipment

Tools and repair parts issued with or authorized for use with the loader are listed in the Basic Issue Items List, appendix B of this manual.

Section II. LUBRICATION

3–3. General Lubrication Information

This section contains lubrication instructions which are supplemental to, and not specifically covered in the lubrication order. For the current lubrication order refer to DA PAM 310–4.

Figure 3–1. NOT USED.

3–4. Detailed Lubrication Information

a. General. Keep all lubricants in closed containers and store in a clean dry place away from external heat. Allow no dust, dirt, or other foreign material to mix with the lubricants.

b. Cleaning. Keep all external parts not requiring lubrication clean of lubricants. Before lubricating the equipment, wipe all lubrication points free of dirt and grease. Clean all lubrication points after lubrication to prevent accumulation of foreign matter.

c. Points of Lubrication. Service the points of lubrication at proper intervals. Reference current Lubrication Order.

Note. Service to be performed after initial 50 hours of operation. Remove and replace transmission oil filter element and clean sump strainer. Remove and replace hydraulic tank oil filter element, also clean strainer and magnets.

d. Crankcase Oil Level.

(1) Crankcase oil level must be checked daily.

(2) Check oil level at operating temperature.

(3) After stopping the engine, allow several minutes for the oil to drain back to the oil pan.

(4) Check oil level with dipstick, adding oil as necessary to bring level up to FULL mark on dipstick.

(5) Oil may require changing more frequently than usual because of contamination by dilution. Sludge formation will increase under cold weather operation conditions.

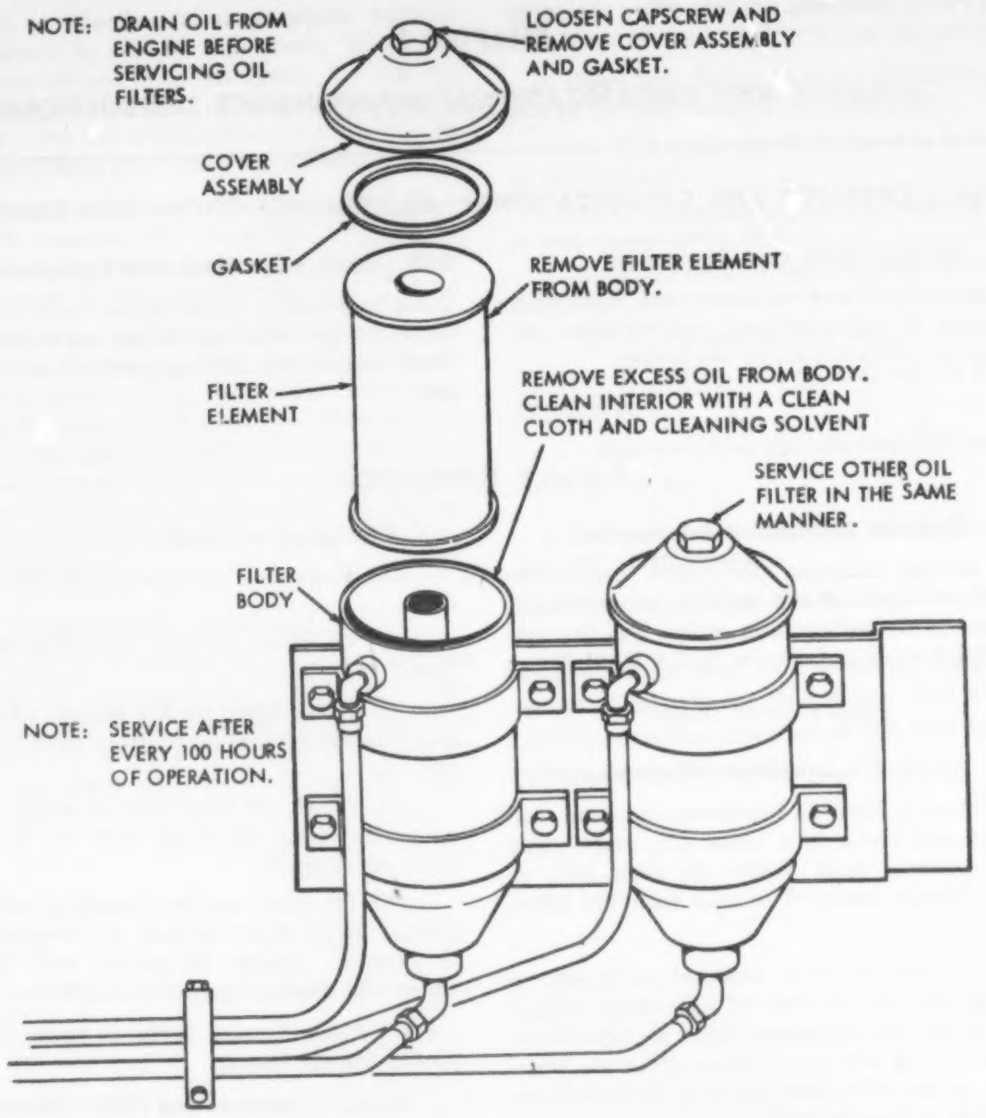
e. Oil Filter Service. Refer to figure 3–2 and service the oil filters.

f. Engine Crankcase and Filter Change.

(1) With engine at operating temperature, remove the magnetic drain plug from the oil pan and allow oil to drain.

(2) Refer to figure 3–2 and service engine oil filter elements. Add one (1) quart of engine oil in each filter body. Replace filter cover assembly with new gasket and tighten securely.

(3) Clean magnetic oil pan drain plug


NOTE: DRAIN OIL FROM ENGINE BEFORE SERVICING OIL FILTERS.
LOOSEN CAPSCREW AND REMOVE COVER ASSEMBLY AND GASKET.
COVER ASSEMBLY
GASKET
REMOVE FILTER ELEMENT FROM BODY.
FILTER ELEMENT
REMOVE EXCESS OIL FROM BODY. CLEAN INTERIOR WITH A CLEAN CLOTH AND CLEANING SOLVENT
SERVICE OTHER OIL FILTER IN THE SAME MANNER.
FILTER BODY
NOTE: SERVICE AFTER EVERY 100 HOURS OF OPERATION.

MEC 3805-239-12/3-2

Figure 3-2. Oil filter service.

and reinstall with new plug gasket, tighten securely.

(4) Fill engine crankcase with twenty-two (22) quarts of engine oil and replace filler plug.

(5) Remove the electrical wire from the top of the fuel injection pump. Crank the engine with the starter for 15 seconds. This will ensure the filters are filled and that oil has been pumped to the various engine components before the engine is started.

(6) Reconnect the injection pump wire

and start engine. Operate engine at low idle for about 15 seconds, then increase engine to fast idle for about 5 minutes.

***Caution:* When starting the engine, observe the engine oil pressure gauge on the instrument panel. If the the engine is cold no pressure will be indicated by the gauge for a few seconds after the engine starts; but if the pressure does not then rise to normal or above, the engine must be stopped immediately and the cause determined and corrected. It is extremely important after starting the engine, to allow the engine to idle for approximately five minutes, without racing, to permit the lubricating oil to warm and circulate freely through the bearings before the turbocharger is operated at high speed. This procedure should be stressed especially for cold weather starting. Allowing the turbocharger to operate at high speed without sufficient lubrication may result in complete failure of the turbocharger bearings in 30 seconds or less.**

(7) Stop engine and allow several minutes for the oil to the drain back before checking the oil level. Using the oil level dipstick, check the oil level and, if necessary, add oil to raise oil level to the "Full" mark on the dipstick.

(8) Observe oil filters and drain plug for leakage and correct if necessary.

Section III. PREVENTIVE MAINTENANCE SERVICES

3–5. General

To insure that the loader is ready for operation at all times, it must be inspected systematically so that defects may be discovered and corrected before they result in serious damage or failure. The necessary preventive maintenance services to be performed are listed and described in paragraphs 3–6 and 3–7. Item numbers indicate the minimum inspection requirements. Defects discovered during operation of the unit shall be noted for future correction, to be made as soon as the operation has ceased. Stop operation immediately if deficiency is noticed which would damage equipment if operation were continued. All deficiencies and short comings will be recorded together with the corrective action taken on DA Form 2404 (Equipment Inspectior and Maintenance Worksheet) at the earliest possible opportunity.

3–6. Daily Preventive Maintenance

This paragraph contains an illustrated tabulated listing of preventive maintenance services which must be performed by the operator. The item numbers are listed consecutively and indicate the sequence of minimum requirements. Refer to figure 3–3 for the daily preventive maintenance services.

3–7. Quarterly Preventive Maintenance Services

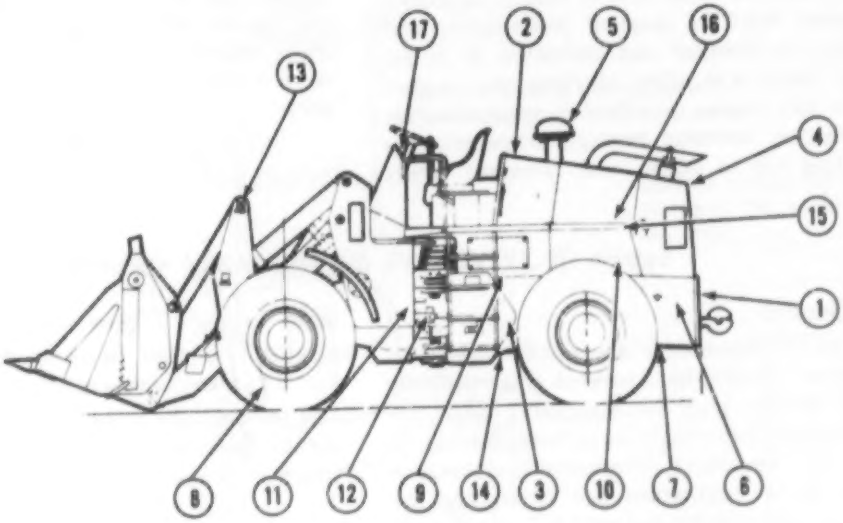
a. This paragraph contains an illustrated tabulated listing of preventive maintenance services which must be performed by organizational maintenance personnel at quarterly intervals. A quarterly interval is equal to 3 calendar months, or 250 hours of operation, whichever occurs first.

b. The item numbers are listed consecutively and indicate the sequence of minimum requirements. Refer to figure 3–4 for the quarterly preventive maintenance services.

PREVENTIVE MAINTENANCE SERVICES

DAILY

TM 5-3805-239-12 ALLIS-CHALMERS MODEL 645M SCOOP-TYPE LOADER



LUBRICATE IN ACCORDANCE WITH CURRENT LUBRICATION ORDER

ITEM		PAR REF
1	FUEL TANK. Drain condensation and sediment. Add fuel as required.	3-9
2	HYDRAULIC SYSTEM. Check oil level.	3-4
3	TRANSMISSION. Check oil level.	3-4
4	RADIATOR. Check coolant level. Proper level is within one inch of top of radiator.	3-62
5	AIR CLEANER. Check restriction indicator. Remove flexible unloader and clean unloader.	3-9
6	BATTERIES. Tighten loose cables and mountings. Remove corrosion. Fill with electrolyte to level indicated. In freezing weather run the engine a minimum of one hour after adding water. Clean vent holes in filler caps (weekly).	3-100
7	ENGINE CRANKCASE. Check oil level and replenish as necessary.	3-4

MEC 3805-239-12/3-3 ①

Figure 3-3①. Daily preventive maintenance services.

ITEM		PAR REF
8	TIRES. Inspect for cuts and damage. Check pressure. Correct pressure is 45 psi.	3-76
9	BREATHERS. Check for presence of foreign material and clean.	3-4
10	FUEL SEDIMENT BOWL. Check for water and sediment. Clean if necessary.	3-9
11	AIR RESERVOIR. Drain condensation.	3-80
12	STEERING LINKAGE. Lubricate. Refer to current L.O.	3-4
13	LOADER LINKAGE. Lubricate. Refer to current L.O.	3-4
14	REAR AXLE PIVOT PINS. Lubricate. Refer to current L.O.	3-4
15	FAN BELTS. Proper adjustment is a deflection of 1/2 inch midway between pulleys. (Check adjustment weekly.)	3-11
16	COMPRESSOR BELT. Proper adjustment is a deflection of 1/2 inch midway between pulleys. (Check adjustment weekly.)	3-12
17	CONTROLS AND INSTRUMENTS. Inspect for damage and insecure mounting. With the unit operating inspect for improper operation. Normal operating ranges for the instruments are as follows: Engine Coolant Temperature Gage 165°-200°F Engine Oil Pressure Gage 30-55 psi Ammeter 0-10 amps Transmission Oil Pressure Gage 140-175 psi Transmission Temperature Gage 150°-250°F Air Pressure Gage 75-125 psi	
	NOTE 1. OPERATION. During operation observe for any unusual noise or vibration.	

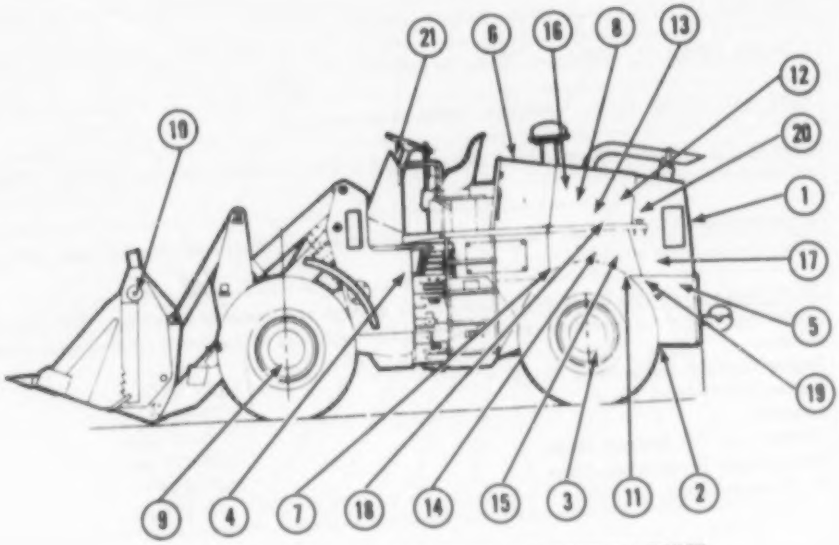
MEC 3805-239-12/3-3 ②

Figure 3-3①—Continued.

PREVENTIVE MAINTENANCE SERVICES

QUARTERLY

TM 5-3805-239-12 | ALLIS-CHALMERS MODEL 645M | SCOOP-TYPE LOADER



LUBRICATE IN ACCORDANCE WITH CURRENT LUBRICATION ORDER

ITEM		PAR REF
1	RADIATOR. Check for leaks. Check cooling fins for damage.	3-62
2	AXLE DIFFERENTIALS. Check oil level. (Also check at 100 hours.)	3-4
3	PLANETARY HUBS. Check oil level. (Also check at 100 hours.)	3-4
4	BRAKE MASTER CYLINDERS. Check fluid level. (Also check at 100 hours.)	3-82
5	BATTERIES. Check specific gravity. (Also check at 100 hours.)	3-100
6	HYDRAULIC SYSTEM. Replace filter element. Clean screen and magnet. Tighten fittings. Check and adjust operation.	3-92
7	ENGINE OIL FILTERS. Replace filters. ([illegible]o replace filters at 100 hours.)	3-4

MEC 3805-239-12/3-4 ①

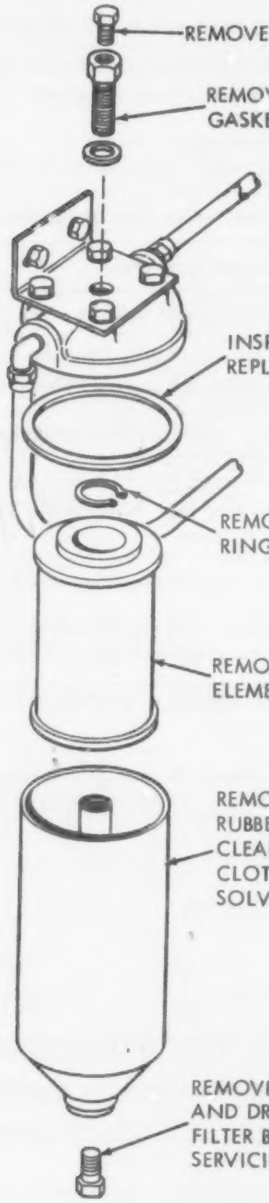
Figure 3-4①. Quarterly preventive maintenance services.

ITEM		PAR REF
8	TURBOCHARGER. Inspect for air, exhaust, and oil leaks or unusual noises. (Also inspect at 100 hours.)	3-54
9	WHEEL LUG NUTS. Check torque. Torque nuts to 365-400 foot pounds. (Also check and torque at 100 hours.)	3-77
10	SCREWS, NUTS, AND PINS. Check and tighten as required. (Also check and tighten at 100 hours.)	3-96
11	ENGINE CRANKCASE. Change oil. (Also change oil at 100 hours.)	3-4
12	ENGINE BREATHER TUBE. Clean tube. (Also clean at 100 hours.)	3-57
13	WATER PUMP. Check for leaks and loose mounting.	3-66
14	FUEL INJECTION PUMP. Check for leaks and loose mounting. Check and adjust idle speeds. Check fuel strainer in pump and clean.	3-45
15	FUEL TRANSFER PUMP. Check operation and pressure. Adjust pressure.	3-45
16	FUEL INJECTION NOZZLES. Check operation. Inspect for leaks and damage. Check torque of mounting nuts. Torque is 9 to 12 foot pounds.	3-45
17	BELTS. Check belts for fraying and stretching. Adjust belts. Proper deflection is 1/2 inch midway between pulleys.	3-11 3-12
18	ALTERNATOR. Check for loose mounting and electrical connections. Tighten all screws. Replace a defective alternator.	3-101
19	GROUND. Check for proper ground and tighten all ground connections.	3-100
20	THERMOSTAT. Check for leaks and deteriorated or damaged hose. Check thermostat operation. Replace defective thermostat.	3-67
21	CONTROLS AND INSTRUMENTS. Inspect for damage and insecure mounting. With the unit operating inspect for improper operation. Normal operating ranges for instruments are as follows: Engine Coolant Temperature Gage 165°-200°F Engine Oil Pressure Gage 30-55 psi Ammeter 0-10 amps Transmission Oil Pressure Gage 140-175 psi Transmission Temperature Gage 150°-250°F Air Pressure Gage 75-125 psi	
	NOTE 1. OPERATIONAL TEST. During operation observe any unusual noises or vibrations. NOTE 2. ADJUSTMENTS. Make all adjustment during operational test.	

MEC 3805-239-12/3-4 ②

Figure 3-4②—**Continued**

Section IV. OPERATOR'S MAINTENANCE



REMOVE VENT PLUG.

REMOVE SCREW AND GASKET.

INSPECT GASKET AND REPLACE IF NECESSARY.

NOTE: AFTER INSTALLING NEW ELEMENT, VENT SYSTEM BY LOOSENING VENT PLUG AND PUMPING FUEL PRIMER (FIG. 3-6) UNTIL FLOW OF FUEL AROUND VENT PLUG IS FREE OF AIR BUBBLES. TIGHTEN VENT PLUG.

REMOVE RETAINING RING.

NOTE: SERVICE FUEL FILTER EVERY 500 HOURS.

REMOVE AND DISCARD ELEMENT.

REMOVE BODY. CHECK RUBBER SEAT AND SPRING. CLEAN BODY WITH CLEAN CLOTH AND CLEANING SOLVENT.

REMOVE DRAIN PLUG AND DRAIN FUEL FILTER BEFORE SERVICING.

MEC 3805-239-12/3-5

Figure 3-5. Fuel filter service.

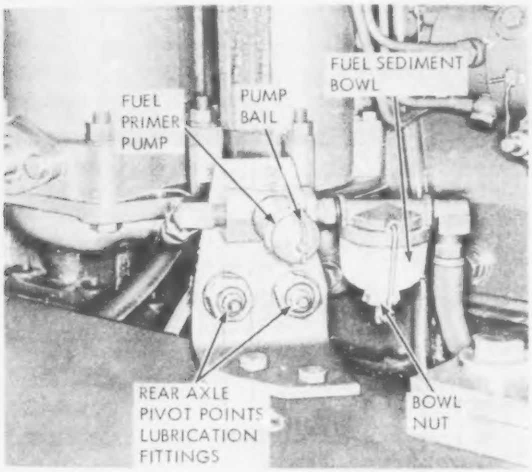
3-8. General

Instructions in this section are published for the information and guidance of the operator to maintain the loader.

3-9. Fuel System Service

a. Service.

(1) The secondary fuel filter is mounted on the left side of the engine. The fuel sediment bowl (primary filter) is mounted on a bracket along the frame on the left side of the engine near the fuel injection pump.



STEP 1. LOOSEN NUT AND REMOVE BAIL.
STEP 2. REMOVE AND EMPTY FUEL SEDIMENT BOWL.
STEP 3. CLEAN BOWL WITH A CLEAN CLOTH.
STEP 4. CHECK BOWL GASKET AND REPLACE IF NECESSARY.
STEP 5. INSTALL SEDIMENT BOWL AND SECURE WITH BAIL AND NUT.
STEP 6. VENT FUEL SYSTEM AS DESCRIBED ON FIGURE 3-5.
NOTE: TO OPERATE PRIMER PUMP, LOOSEN LOCKING SCREW AND MOVE PUMP BAIL TO ONE SIDE. MOVE PRIMER PLUNGER BACK AND FORTH IN A PUMPING MOTION TO FILL FUEL FILTER AND BOWL AND EXPEL AIR FROM SYSTEM.

MEC 3805-239-12/3-6

Figure 3-6. Fuel sediment bowl service.

(2) Refer to figure 3-5 to service the fuel filter element.

(3) Refer to figure 3-6 to service the fuel sediment bowl.

(4) To drain fuel tank when necessary, remove plug (21, fig. 3-19) and gasket.

b. Vent and Prime Fuel System.

(1) *General.* The fuel system may require venting and priming after replacement of the fuel filter or cleaning of the fuel sediment bowl. A priming pump (fig. 3-6) mounted in the fuel line after the fuel sediment bowl is supplied to vent and prime the low pressure fuel system.

(2) *Low pressure fuel system venting and priming.* After replacement of the fuel filter or cleaning sediment bowl vent and prime the fuel system as follows.

Note. The low pressure fuel system consists of the fuel tank, fuel sediment bowl, fuel primer pump, fuel filter, transfer pump, and fuel lines between tank and pump and the fuel return lines. The high pressure fuel system begins at the fuel injection pump and includes the pump outlet ports and fuel lines from the pump to the nozzles.

(*a*) Loosen vent plug (fig. 3-6) in top of fuel filter.

(*b*) Loosen screw and move bail on fuel primer pump (fig. 3-6) to one side.

(*c*) Move primer pump plunger back and forth in a pumping motion to pump fuel through fuel filter.

(*d*) Continue pumping until fuel filter has filled with fuel and flow of fuel around vent plug is free of air bubbles.

(*e*) Tighten vent plug securely into top of fuel filter.

(*f*) Install bail on primer pump and secure with locking screw.

(3) *High pressure fuel system venting.* If fuel lines have been removed, the engine has run out of fuel, or the loader has not been operated for sometime it may be necessary to vent the high pressure system to facilitate starting the engine.

(*a*) Disconnect fuel lines at all six nozzle and holders (fig. 3-7).

(*b*) Depress accelerator (fig. 2-3) and crank engine (para 2-12).

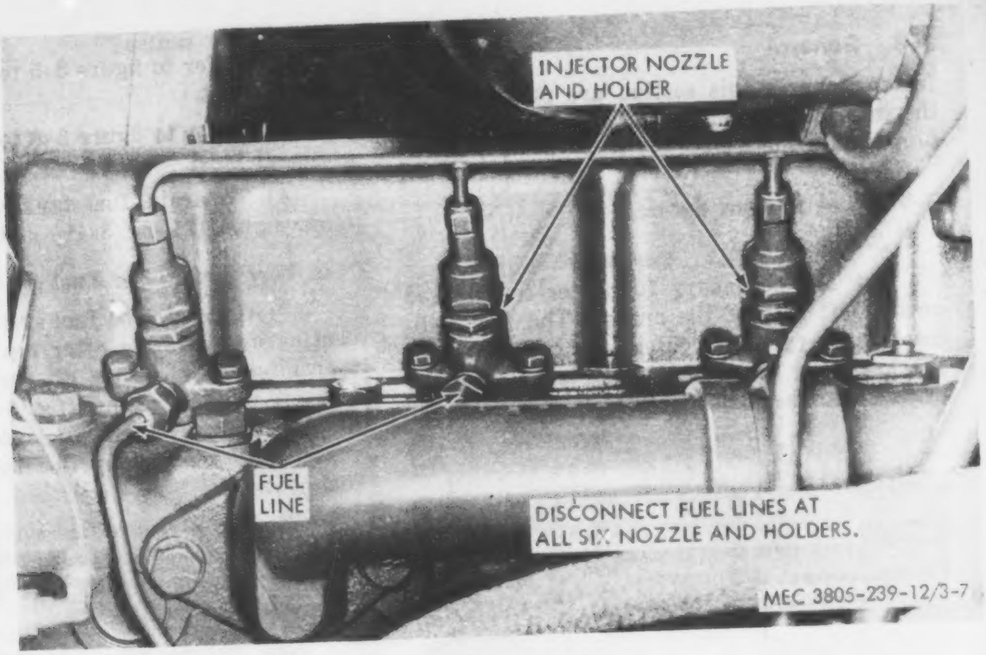
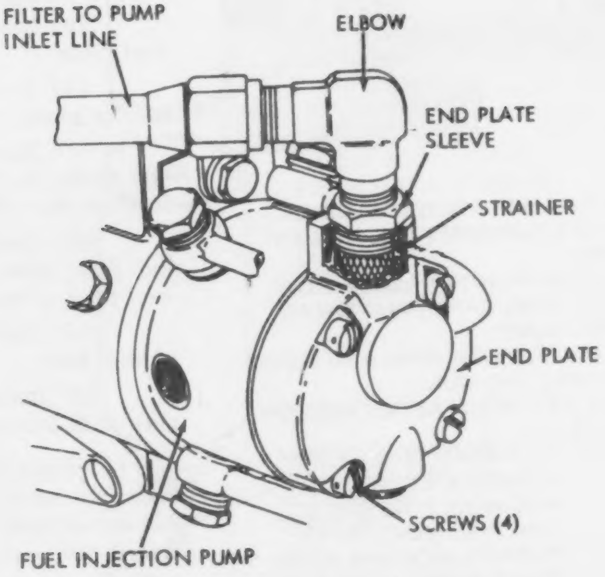
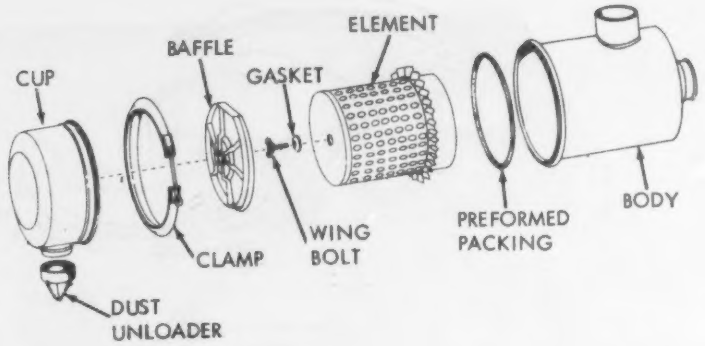

INJECTOR NOZZLE AND HOLDER
FUEL LINE
DISCONNECT FUEL LINES AT ALL SIX NOZZLE AND HOLDERS.
MEC 3805-239-12/3-7

Figure 3-7. Fuel system venting and priming.



MEC 3805-239-12/3-8

Figure 3-8. Transfer pump strainer service.



NOTE: WHEN AIR CLEANER INDICATOR IS LOCKED IN UP POSITION, CLEAN FILTER ELEMENT. REMOVE AND CLEAN DUST UNLOADER EVERY EIGHT HOURS OF OPERATION.

STEP 1. LOOSEN CLAMP AND REMOVE CUP. REMOVE BAFFLE.
STEP 2. REMOVE WING BOLT AND GASKET.
STEP 3. REMOVE FILTER ELEMENT AND DISCARD PREFORMED PACKING.
STEP 4. CLEAN EXTERIOR AND INTERIOR OF CLEANER BODY.
STEP 5. BLOW DUST AND DIRT FROM ELEMENT WITH CLEAN DRY COMPRESSED AIR. BLOW FROM INSIDE OUT.
STEP 6. INSTALL NEW PACKING AND ELEMENT IN BODY AND SECURE WITH WING BOLT AND GASKET. INSTALL BAFFLE.
STEP 7. INSTALL CUP AND SECURE WITH CLAMP.

NOTE: REPLACE ELEMENT AFTER SIX CLEANINGS.

MEC 3805-239-12/3-9

Figure 3-9. Air cleaner service.

(*c*) Observe fuel lines and check to see that fuel flows from each line, with no air bubbles present. Discontinue cranking.

(*d*) Connect fuel lines to nozzle holders and tighten securely.

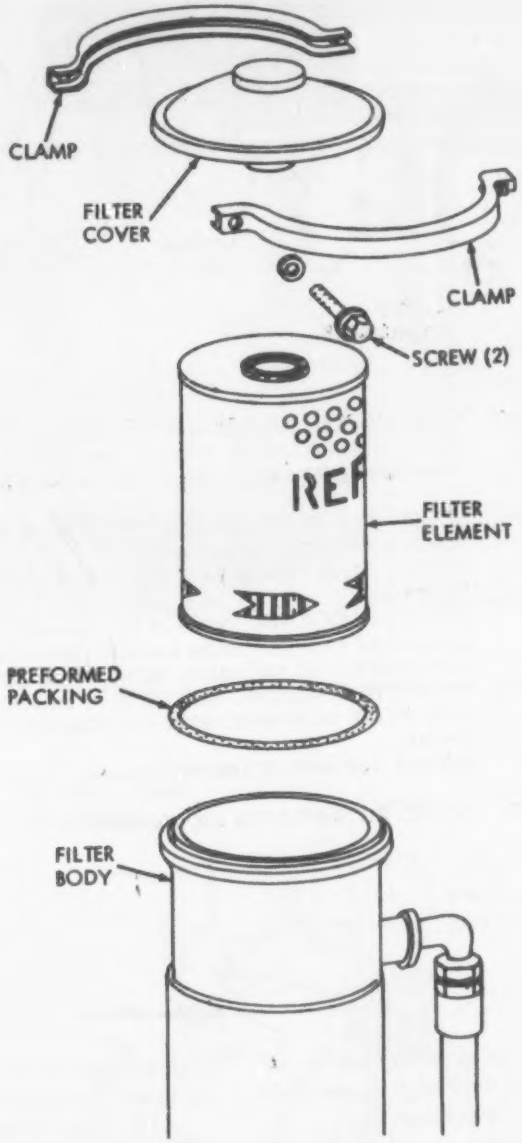
c. Fuel Injection Pump Service.

(1) *General.* If engine is running erratically and above service does not correct operation, check for clogged, crimped, or leaking fuel lines in both low pressure and high pressure systems. Disconnect lines and blow clear with compressed air if possible. If lines are crimped and must be replaced, refer to organizational maintenance.

(2) *Fuel transfer pump service.* The fuel transfer pump is mounted on the end of the fuel injection pump assembly. This pump draws fuel from the tank through the sediment bowl, hand primer, and fuel filter and delivers it to the cam actuated fuel injection pump.

(*a*) Check strainer in fuel transfer pump. Disconnect inlet fuel line (fig. 3-8) and remove elbow.

(*b*) Remove end plate sleeve (fig. 3-8) and remove strainer.

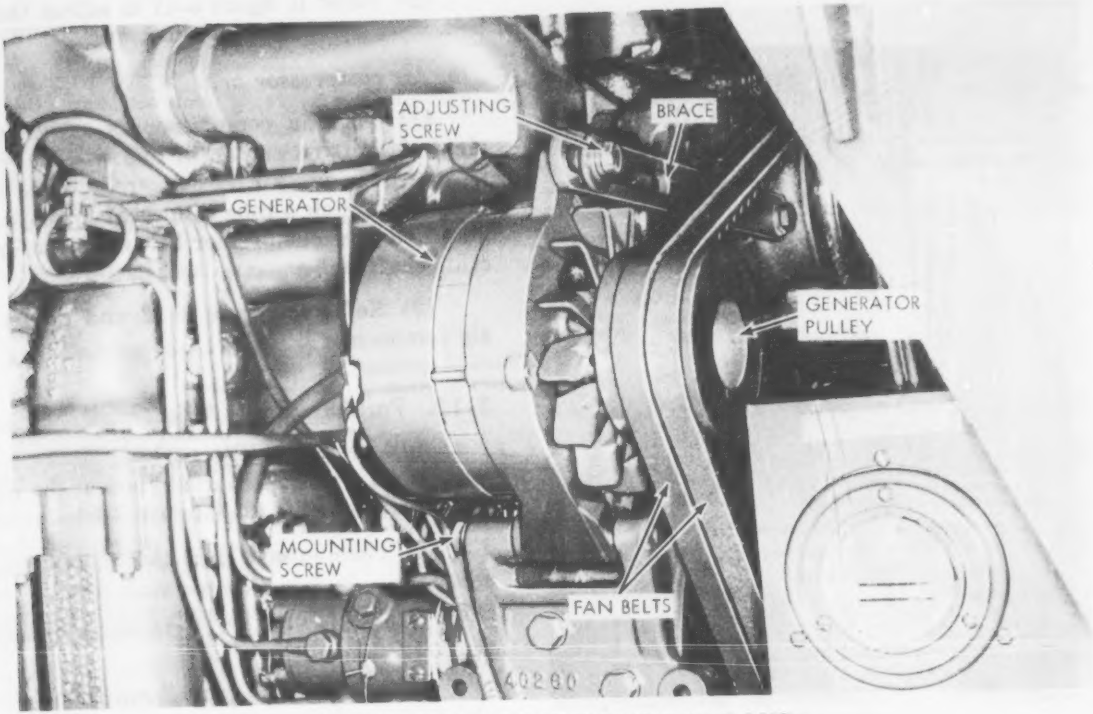


NOTE: REPLACE FILTER ELEMENT EVERY 1000 HOURS.

STEP 1. CLEAN COVER AND BODY THOROUGHLY.
STEP 2. REMOVE TWO SCREWS AND LOCK WASHERS AND REMOVE TWO CLAMPS.
STEP 3. REMOVE COVER, FILTER ELEMENT, AND PACKING. DISCARD PACKING.
STEP 4. CLEAN FILTER BODY.
STEP 5. INSTALL NEW FILTER ELEMENT AND PACKING.
STEP 6. INSTALL FILTER COVER AND SECURE WITH TWO CLAMPS, TWO SCREWS, AND TWO LOCK WASHERS.

MEC 3805-239-12/3-10

Figure 3-10. Transmission oil filter service.



STEP 1. LOOSEN GENERATOR MOUNTING SCREW.
STEP 2. LOOSEN ADJUSTING SCREW.
STEP 3. MOVE GENERATOR IN OR OUT ON BRACE TO PROVIDE 3/16 TO 1/2 INCH DEFLECTION OF FAN BELTS MIDWAY BETWEEN GENERATOR PULLEY AND CRANKSHAFT PULLEY.
STEP 4. TIGHTEN ADJUSTING SCREW SECURELY.
STEP 5. TIGHTEN GENERATOR MOUNTING SCREW SECURELY.

MEC 3805-239-12/3-11

Figure 3-11. Fan belt adjustment.

(*c*) Clean strainer and install strainer and end plate sleeve in pump.

(*d*) Install elbow and connect inlet fuel line.

(*e*) Prime and vent fuel system if necessary.

d. Air Cleaner Service. Refer to figure 3-9 and service the air cleaner.

3-10. Transmission Oil Filter Service

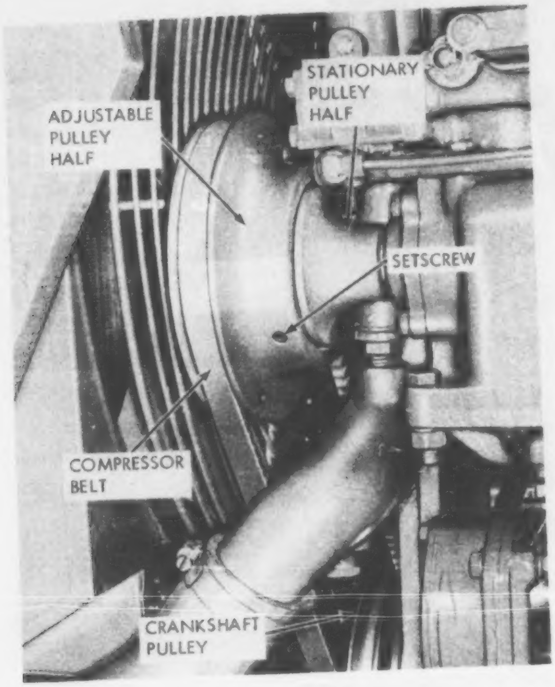
a. The transmission oil filter is mounted on the right side of the engine next to the engine crankcase filler pipe.

b. Refer to figure 3-10 to service the transmission oil filter element.

3-11. Belt Adjustment

a. Fan belt

(1) The two fan belts are driven by the crankshaft pulley and in turn drive the engine cooling fan and the battery charging generator (alternator). The generator is mounted on an adjustable bracket.



STEP 1. LOOSEN THREE SETSCREWS.
STEP 2. TURN ADJUSTABLE PULLEY HALF CLOCKWISE ONE QUARTER TURN AT A TIME TO TIGHTEN BELT.
STEP 3. ADJUST PULLEY UNTIL BELT CAN BE PRESSED IN ONE HALF INCH AT A POINT MIDWAY BETWEEN COMPRESSOR PULLEY AND CRANKSHAFT PULLEY.
STEP 4. TIGHTEN SETSCREWS SECURELY.

MEC 3805-239-12/3-12

Figure 3-12. Air compressor belt adjustment.

(2) Refer to figure 3-11 to adjust the fan belt.

b. Air compressor belt

(1) The air compressor is mounted on right side of the engine in line with the thermostat housing. Air is delivered to the compressor through a tube connected to the intake manifold. The compressor belt is driven by the crankshaft pulley.

(2) Refer to figure 3-12 and adjust the air compressor belt.

3-12. Parking Brake Adjustment

a. Adjustment of the parking brake is accomplished with the knurled knob at the top of the operating lever (21), figure 3-54.

(1) Place lever (7) in the off (down) position.

(2) Rotate knob (21) clockwise to tighten brake adjustment.

(3) Raise lever to on position. Significant effort must be required to pull lever into a vertical position.

(4) Continued tightening knob (21) until pull is as required.

Section V. TROUBLESHOOTING

3-13. General

This section provides information useful in diagnosing and correcting unsatisfactory operation or failure of the loader and its components. Each trouble symptom stated is followed by a list of probable causes. The possible remedy recommended is described opposite the probable cause. Any trouble beyond the scope of organizational maintenance shall be reported to direct support maintenance.

3-14. Engine Fails to Turn Over

Probable cause	*Possible remedy*
Defective neutral start switch	Replace switch (para 3-69).
Weak or defective batteries	Charge batteries or replace batteries (para 3-100).
Defective starter	Replace starter (para 3-104).

3-15. Engine Fails to Start

Probable cause	*Possible remedy*
Cranking speed too slow	Check batteries and charge batteries, if necessary. Replace defective batteries (para 3-100).
Engine controls not adjusted properly	Check and adjust engine controls (para 3-48).
Insufficient fuel	Check fuel system (para 3-9). Clean sediment bowl (para 3-9).
Fuel injection nozzles not receiving fuel	Check fuel system (para 3-9). Replace defective fuel lines and/or nozzles (para 3-45).
Fuel injection pump not operating properly	Check pump and service (para 3-9). If unable to correct, report this condition as stipulated in TM 38-750.

3-16. Engine Hard to Start

Probable cause	*Possible remedy*
Insufficient fuel in tank or incorrect grade	Check fuel tank and fill with correct grade of fuel. Vent fuel system (para 3-9).
Clogged filter and/or sediment	Check fuel system (para 3-9) and change fuel filter and/or clean bowl.
Fuel injection nozzle defective	Report this condition to direct support maintenance.
Air in fuel system	Check fuel system and vent (para 3-9).
Insufficient air to engine	Check and clean air cleaner if necessary (para 3-9).
Fuel injection pump not timed properly or defective	Report this condition to direct support maintenance.
Incorrect valve adjustment or defective valves or engine parts.	Report this condition to direct support maintenance.

3-17. Engine Stops Frequently

Probable cause	*Possible remedy*
Idling speed too low	Adjust idle speed (para 3-48).
Restricted fuel supply or air in fuel system	Check fuel system (para 3-9) and correct.

3-18. Engine Stops Suddenly

Probable cause	*Possible remedy*
Fuel tank empty	Fill fuel tank. Vent fuel system (para 3-9).
Restricted fuel supply or damaged fuel lines	Check fuel system (para 3-9) and correct.
Fuel injection pump defective	Report this condition to direct support maintenance.

3-19. Engine Overheats

Probable cause	*Possible remedy*
Coolant level low	Check and fill radiator (para 3-62).
Radiator air passages clogged	Clean air passages.
Radiator core leaking, clogged, or damaged	Replace radiator (para 3-63).
Fan belts loose or damaged	Adjust belts (para 3-11) or replace belts (para 3-64).
Defective thermostat	Replace thermostat (para 3-67).
Defective water pump	Replace water pump (para 3-66).
Engine oil or transmission oil cooler defective	Report this condition to direct support maintenance.
Defective engine lubrication system	Report this condition to direct support maintenance.
Improperly timed or defective fuel injection pump	Report this condition to direct support maintenance.

3-20. Engine Power Low

Probable cause	*Possible remedy*
Insufficient supply or air to cylinders	Check fuel system. Service air cleaner (para 3-9).
Insufficient supply of fuel to nozzles	Check fuel system (para 3-9) and correct.
Fuel injection pump not properly timed	Report this condition to direct support maintenance.
Loss of compression	Report this condition to direct support maintenance.
Cylinder cutting out	Check cylinders and nozzles (para 3-45). Report condition to direct support maintenance.

3–21. Engine Runs Uneven With Excessive Vibration

Probable cause	*Possible remedy*
Fuel supply erratic or insufficient	Check fuel system (para 3–9) and correct.
Engine operating temperature too low	Check thermostat (para 3–67) and replace if necessary.
Cylinder cutting out	Check cylinders and nozzles (para 3–45).
Fuel injector nozzles not operating properly	Report this condition to direct support maintenance.
Fuel injection pump defective	Report this condition to direct support maintenance.
Valves burned or damaged	Report this condition to direct support maintenance.

3–22. Engine Emits Black Smoke From Exhaust

Probable cause	*Possible remedy*
Insufficient air to cylinders	Check air cleaner. Service air cleaner (para 3–9).
Fuel injection pump defective	Report this condition to direct support maintenance.

3–23. Engine Oil Pressure Low

Probable cause	*Possible remedy*
Crankcase oil level low	Check oil level. Fill with correct oil. Refer to current L.O.
External oil leak	Check oil lines and correct if possible.
Defective oil pressure gage	Replace defective gage (para 3–108).

3–24. Starter Will Not Crank Engine

Probable cause	*Possible remedy*
Batteries weak	Check batteries and charge if necessary. Replace defective batteries (para 3–100).
Loose connections or cables	Clean corrosion from terminals and tighten connections.
Starter switch (on transmission lever) inoperative	Replace switch (para 3–69).
Starter defective	Replace starter (para 3–104).

3–25. Electrical System Not Providing Power

Probable cause	*Possible remedy*
Batteries low or defective	Charge batteries or replace defective batteries (para 3–100).
Loose, corroded or defective cables	Clean cables. Tighten cables. Replace defective cables (para 3–100).
Defective generator	Replace defective generator (para 3–101).
Defective voltage regulator	Replace defective voltage regulator (para 3–103).

3–26. Generator Not Charging

Probable cause	*Possible remedy*
Drive belt loose or broken	Adjust belts (para 3–11). Replace broken belt (para 3–64).
Defective ammeter	Replace defective ammeter (para 3–108).
Defective circuit breaker	Replace circuit breaker (para 3–108).
Defective voltage regulator	Replace defective voltage regulator (para 3–103).

3–27. Head Lights and Flood Lights Not Operating Properly

Probable cause	*Possible remedy*
Lamps burned out	Replace defective lamps (para 3–105).
Defective circuit breaker	Replace defective circuit breaker (para 3–108).
Loose wire connections	Tighten connections.
Defective light switch	Replace defective light switch (para 3–108).

3–28. Air Intake System not Operating Properly

Probable cause	*Possible remedy*
Clogged or defective air cleaner	Service air cleaner (para 3–51).
Defective air hoses or piping	Replace defective hoses or piping (para 3–51).
Defective turbocharger	Report this condition to direct support maintenance.

3-29. Exhaust System not Operating Properly

Probable cause	*Possible remedy*
Defective or restricted exhaust muffler or pipe	Replace defective parts (para 3-54).
Loose or defective clamps	Tighten or replace defective clamps (para 3-54).
Defective exhaust manifold or gasket	Report this condition to direct support maintenance.

3-30. Engine Cooling System not Operating Properly

Probable cause	*Possible remedy*
Coolant level low	Fill cooling system (para 3-62).
Leaking or defective radiator hoses or hose connections	Tighten connections or replace hoses (para 3-63).
Loose or defective fan belts	Adjust fan belts (para 3-11). Replace defective belts (para 3-64).
Clogged cooling system	Refer to TM 9-2858 to test systems and determine cause and corrective action. Clean and flush system. Replace components (para 3-67) if necessary.
Defective thermostat	Replace defective thermostat (para 3-67).
Clogged or defective radiator or grille	Clean grille and radiator or replace (para 3-63).
Defective coolant temperature gage, sending unit, or wiring.	Replace defective parts.

3-31. Loader Will Not Move

Probable cause	*Possible remedy*
Parking brake engaged	Disengage parking brake.
Engine power low	Refer to paragraph 3-20.
Transmission not in proper gear	Shift transmission as necessary.
Transmission oil level low	Check oil level and fill (para 3-4).
Defective transmission, drive shafts, differentials, or planetaries.	Report this condition to direct support maintenance.

3-32. Loader Does Not Steer Properly

Probable cause	*Possible remedy*
No oil or level low in tank	Fill tank to proper level.
Clogged hydraulic filter, magnet, or screen	Service hydraulic filter (para 3-92).
Leaking or defective hydraulic lines	Tighten connections or replace defective lines (para 3-92).
Defective steering cylinders	Replace defective cylinders (para 3-89).
Defective power steering pump	Replace defective pump (para 3-90).
Defective steering control valve	Replace control valve (para 3-92).
Defective steering gear assembly	Replace steering gear assembly (para 3-88).

3-33. Boom Does Not Lift or Lower

Probable cause	*Possible remedy*
Bucket obstructed	Remove obstruction or move loader.
Insufficient oil in hydraulic system	Fill reservoir to correct level.
Clogged hydraulic filter, magnet or screen	Service hydraulic filter (para 3-92).
Leaking or defective hydraulic lines	Tighten connections or replace defective lines (para 3-92).
Defective hydraulic control valve	Replace control valve (para 3-92).
Defective main system hydraulic pump	Replace hydraulic pump (para 3-91).
Defective boom cylinders	Replace boom cylinders (para 3-91).

3-34. Bucket Does Not Operate Properly

Probable cause	*Possible remedy*
Insufficient oil in hydraulic reservoir	Fill hydraulic reservoir to proper level.
Clogged hydraulic filter, magnet, or screen	Service hydraulic filter (para 3-92).
Leaking or defective hydraulic lines	Tighten connections or replace defective lines (para 3-92).

Probable cause	Possible remedy
Defective hydraulic control valve	Replace control valve (para 3-92).
Defective main system hydraulic pump	Replace hydraulic pump (para 3-91).
Defective dump cylinders	Replace dump cylinders (para 3-94).
Defective or improperly adjusted clam safety valve	Adjust or replace clam safety valve (para 3-94).
Defective clam operating cylinders	Replace clam operating cylinders (para 3-94).
Defective bucket	Replace bucket (para 3-96).
Defective steering pump	Replace steering pump.

3–35. Wheel Brakes Do Not Stop Loader

Probable cause	Possible remedy
Insufficient air pressure	Check brake air system and correct.
Insufficient hydraulic fluid in master cylinder	Fill master cylinder to correct level.
Air in brake system	Bleed brake system (para 3-82).
Brakes not adjusted properly	Adjust brakes (para 3-83).
Leaking or defective brake hydraulic lines	Tighten connections or replace defective lines (para 3-82).
Defective master cylinder or power cluster	Replace master cylinder or power cluster (para 3-83).
Defective brake assembly	Report this condition to direct support maintenance.
Compressor belt loose	Adjust compressor belt (para 3-12).
Leaking or defective air lines	Tighten connections or replace defective lines (para 3-80).
Air reservoir leaking or damaged	Replace air reservoir (para 3-80).
Defective compressor governor	Replace governor (para 3-79).
Defective air compressor	Report this condition to direct support maintenance.

3–36. Parking Brake Does Not Hold Loader

Probable cause	Possible remedy
Brake lever or linkage out of adjustment	Adjust brake lever or linkage (para 3-84).
Linkage bent or damaged	Replace damaged linkage (para 3-84).
Defective parking brake	Replace parking brake (para 3-84).

Section VI. RADIO INTERFERENCE SUPPRESSION

3–37. Definitions

a. Interference. The term "interference" as used herein applies to electrical disturbances in the radio frequency range which are generated by the loader and which may interfere with the proper operation of radio receivers or other electronic equipment, or enable the enemy to locate the equipment.

b. Interference Suppression. The term "interference suppression" as used herein applies to the methods used to eliminate or effectively reduce radio interference generated by the loader.

3–38. General Methods Used to Attain Proper Suppression

Essentially, suppression is attained by providing a low resistance path to ground stray currents. Methods used include shielding the ignition and high frequency wires, grounding the frame with bonding straps, and using capacitors and resistors.

3–39. Interference Suppression Components

a. General. The loader is equipped with a diesel engine and has no high frequency ignition wires. A generator (alternator) supplies current to charge the loader batteries.

b. Primary Interference Components. The primary components are those whose primary function is to suppress radio interference. These components consist of a capacitor connected to the generator (alternator) as illustrated on figure 3–13.

3–40. Interference Components

This system does not require radio interference components. Always keep generator wire connections tight. A loose connection may cause radio interference. Refer to figure 3–13 and tighten all wire connections.

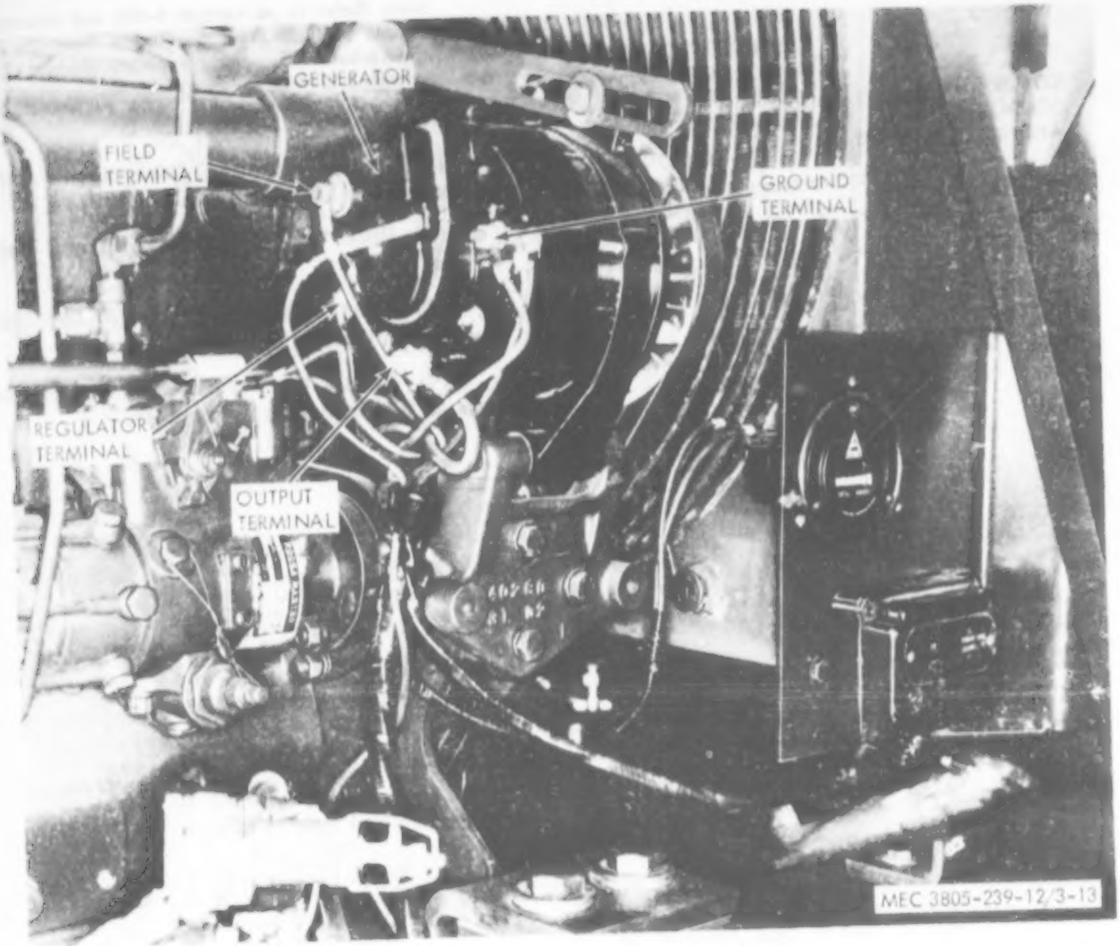


Figure 3-13. Generator wire connections.

Section VII. HOOD AND FENDERS

3-41. General

a. The engine compartment, radiator, and hydraulic reservoir are enclosed in sheet metal hoods. A steel mesh grille is mounted in front of the radiator to allow air movement and to protect the radiator fins and tubes.

b. A ladder, use to enter the loader operator's compartment, is mounted on the left side. Hand rails and handles are mounted with the ladder to provide hand grips for personnel ascending the ladder.

3-42. Hood, Fenders, Ladders, and Handrails

a. Removal.

(1) Loosen or remove the screw and nut securing the air intake and remove the air intake (para 3-51).

(2) Remove the ladder and hand rails as illustrated on figure 3-14.

(3) Remove the hood, fenders, and radiator support as illustrated on figure 3-15.

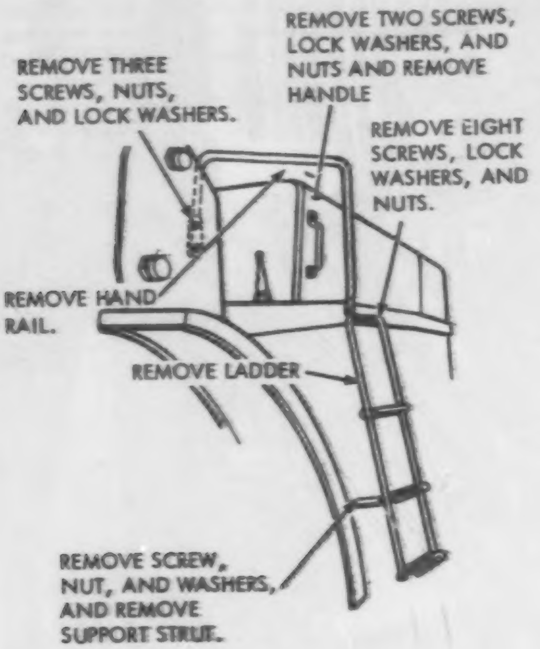

REMOVE THREE SCREWS, NUTS, AND LOCK WASHERS.
REMOVE TWO SCREWS, LOCK WASHERS, AND NUTS AND REMOVE HANDLE
REMOVE EIGHT SCREWS, LOCK WASHERS, AND NUTS.
REMOVE HAND RAIL.
REMOVE LADDER
REMOVE SCREW, NUT, AND WASHERS, AND REMOVE SUPPORT STRUT.

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Figure 3-14. Ladder and hand rails, removal and installation.

Note. Refer to paragraph 3-105 and remove the two blackout taillights and floodlights from the radiator support before removing radiator support. Refer to paragraph 3-63 and remove radiator.

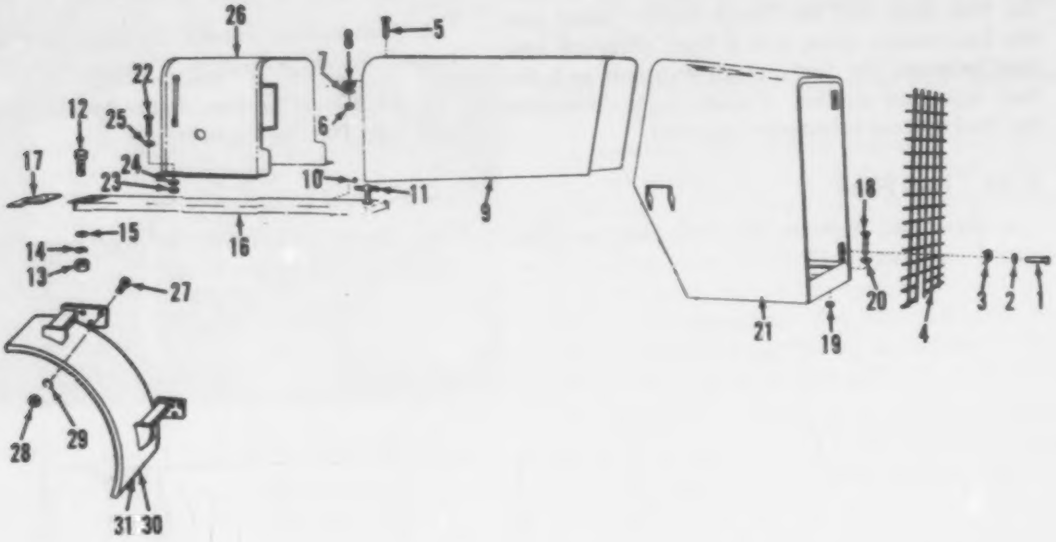
b. Installation.

(1) Install the hood, fenders, and radiator support as illustrated on figure 3-15.

(2) Refer to paragraph 3-63 and install the radiator.

(3) Refer to paragraph 3-105 and install the blackout taillight and floodlights.

(4) Install the access ladder and hand rails as illustrated on figure 3-14.



1 Screw, cap, hex-head, 3/8-24 x 1-3/4 in. (4 rqr)
2 Washer, lock, 3/8 in. (4 rqr)
3 Clip (4 rqr)
4 Radiator grille
5 Screw, cap, hex-head, 3/8-24 x 1 in. (2 rqr)
6 Nut, 3/8-24 (2 rqr)
7 Washer, lock, 3/8 in. (2 rqr)
8 Washer, flat, 3/8 in. (2 rqr)
9 Engine hood
10 Grommet (6 rqr)
11 Fender latch (2 rqr)
12 Screw, cap, hex-head, 3/8-24 x 1 in. (6 rqr)
13 Nut, 3/8-24 (6 rqr)
14 Washer, lock, 3/8 in. (6 rqr)
15 Washer, flat, 3/8 in. (6 rqr)
16 Fender (2 rqr)
17 Support (2 rqr)
18 Screw, cap, hex-head, 5/8-18 x 2-1/4 in. (4 rqr)
19 Nut, 5/8-16 (4 rqr)
20 Washer, flat, 5/8 in. (4 rqr)
21 Radiator support
22 Screw, cap, hex-head, 3/8-24 x 1 in. (4 rqr)
23 Nut, 3/8-24 (4 rqr)
24 Washer, lock, 3/8 in. (4 rqr)
25 Washer, flat, 3/8 in. (4 rqr)
26 Air cleaner hood
27 Screw, cap, hex-head, 1/2-20 x 1-3/4 in. (12 rqr)
28 Nut, 1/2-20 (12 rqr)
29 Washer, lock, 1/2 in. (12 rqr)
30 Right front fender
31 Left front fender

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Figure 3-15. Hood, fenders, and radiator support, removal and installation.

Section VIII. FUEL SYSTEM

3-43. General

a. The fuel system of the loader consists of a fuel tank, fuel sediment bowl, hand primer pump, fuel filter, transfer pump, fuel injection pump, fuel injection nozzles, and fuel lines.

b. Essentially the fuel system is divided in

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two systems, a low pressure system between the fuel tank and the fuel transfer pump and the fuel return lines, and a high pressure system between the fuel injection pump and the fuel injection nozzles. Figure 3-16 illustrates the fuel system schematic diagram.

3-44. Fuel Filter

a. Removal. Remove the fuel filter as illustrated on figure 3-17.

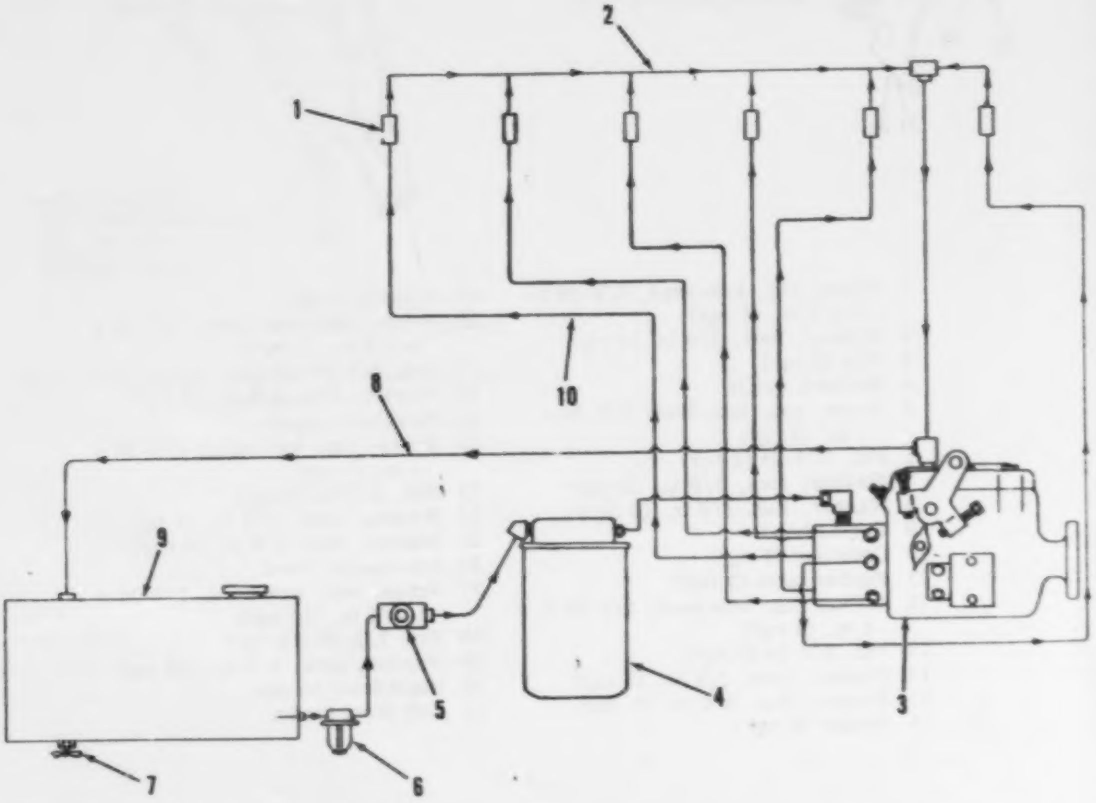
Note. Refer to figure 3-5 to service the fuel filter.

b. Installation. Install the fuel filter as illustrated on figure 3-17.

c. Vent Fuel System. Refer to paragraph 3-9 and vent the fuel system.

3-45. Fuel Injection Lines

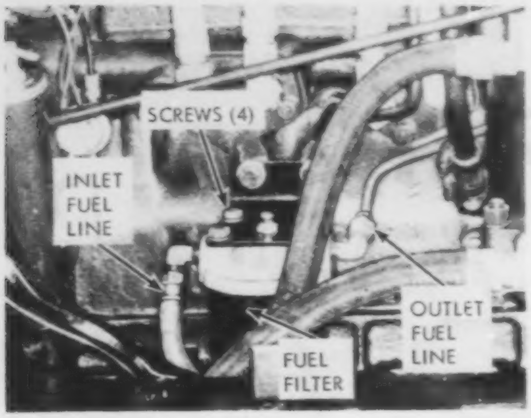
a. Removal. Remove the fuel injection lines illustrated on figure 3-18.



1 Fuel injection nozzle (6 rqr)
2 Fuel return manifold
3 Fuel injection pump
4 Combination fuel filter
5 Hand primer pump
6 Fuel sediment bowl
7 Fuel tank drain
8 Fuel return line
9 Fuel tank
10 Fuel injection lines (6 rqr)

MEC 3805-239-12/3-16

Figure 3-16. Fuel system schematic diagram.



STEP 1. DISCONNECT FUEL LINES FROM FUEL FILTER.
STEP 2. REMOVE FOUR SCREWS AND LOCK WASHERS SECURING FUEL FILTER TO BRACKET.
STEP 3. REMOVE FUEL FILTER FROM BENEATH BRACKET.

MEC 3805-239-12/3-17

Figure 3-17. Fuel filter, removal and installation.

b. Installation. Install fuel injection lines as illustrated on figure 3-18.

c. Vent Fuel System. Refer to paragraph 3-9 and vent the fuel system.

3-46. Fuel Tank

a. General. The fuel tank is mounted at the rear of the loader, beneath the radiator. The filler pipe extends through the radiator grille for access in filling tank.

b. Removal.

(1) Refer to paragraph 3-42 and remove radiator grill.

(2) Drain fuel from tank into a suitable clean container.

(3) Remove fuel tank and components as illustrated on figure 3-19. Discard gaskets and packings.

c. Installation.

(1) Install fuel tank and components in reverse of the numerical sequence as illustrated on figure 3-19.

(2) Refer to paragraph 3-42 and install the radiator grill.

3-47. Fuel Primer Pump and Fuel Sediment Bowl

a. General. The primer pump is used to fill the fuel system to provide for initial starting of the engine. It is also used to prime the system after changing the fuel filter or servicing the fuel system. It also serves to prevent fuel from draining out of the system when the engine is not operating. The fuel sediment bowl aids in removing any water or sediment which may be present in the fuel before it is filtered.

b. Removal. Refer to figure 3-20 and remove the hand primer pump and fuel sediment bowl. Shut off valve at fuel tank before removing components.

c. Disassembly. Disassemble the hand primer pump in the numerical sequence as illustrated on figure 3-21. Discard all gaskets and packings.

d. Reassembly. Reassemble the hand primer pump in reverse of the numerical sequence as illustrated on figure 3-21.

e. Installation. Install the hand primer pump and fuel sediment bowl as illustrated on figure 3-20.

f. Vent and Prime Fuel System. Open shut off valve on fuel tank. Refer to paragraph 3-9 and vent and prime fuel system.

3-48. Throttle Controls and Linkage

a. General. The accelerator is connected to the speed control lever on the fuel injection pump through a linkage. Two rods connected to levers provide the motive force between the accelerator and fuel injection pump.

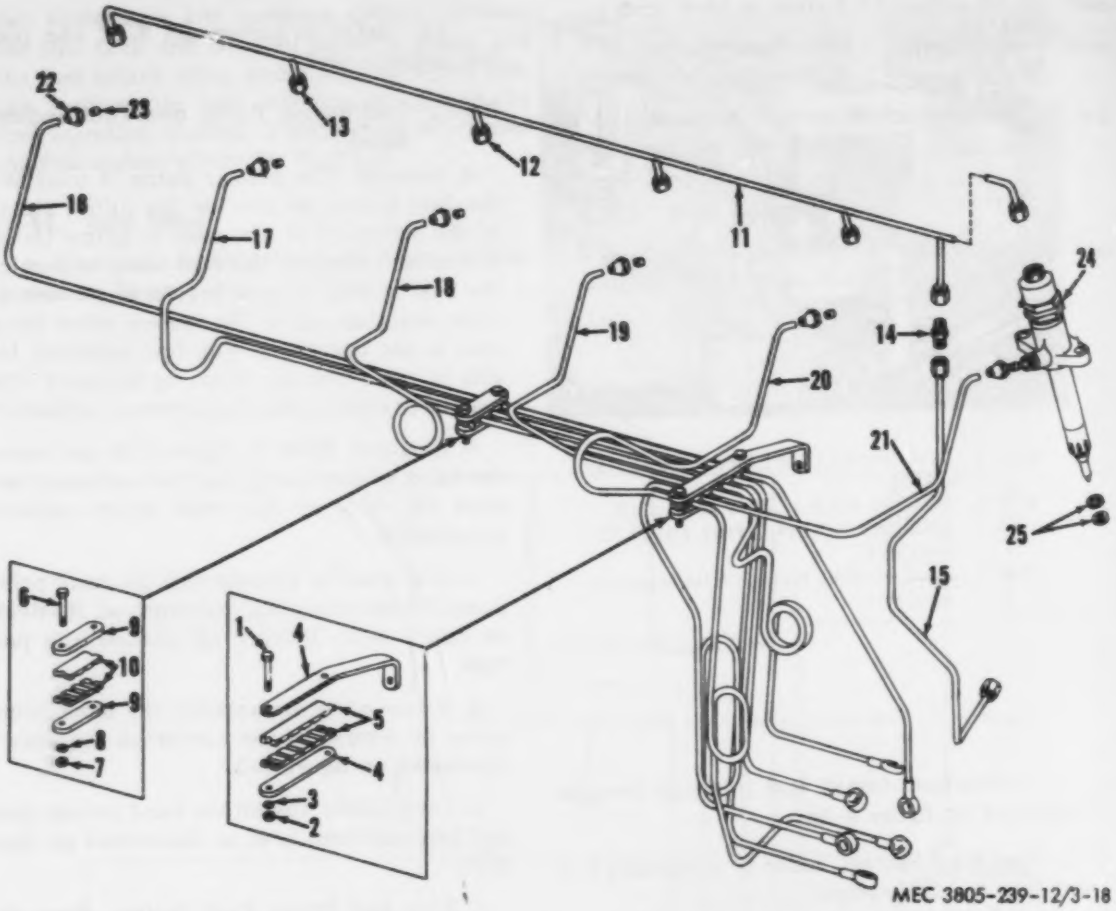
b. Removal. Refer to figure 3-22 and remove the throttle linkage.

c. Installation. Refer to figure 3-22 and install the throttle linkage.

d. Adjustment. Refer to figure 3-22 and adjust the throttle linkage.

3-49. Cold Weather Starting Aid

a. General. The cold weather starting aid is mounted on the rear of the hydraulic reservoir.

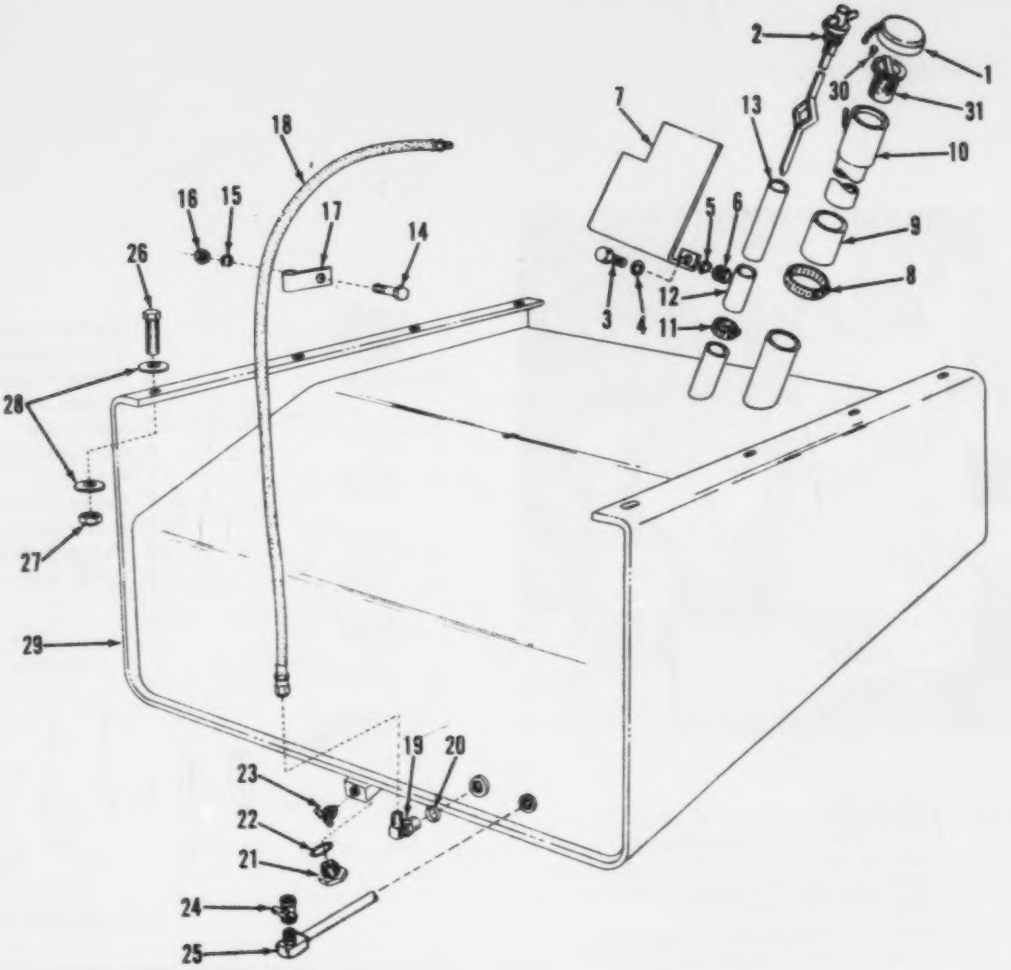


1 Screw, cap, hex-head, 1/4-20 x 1 1/4 in. (2)
2 Nut, 1/4-20 (2)
3 Washer, lock, 1/4 in. (2)
4 Clamp assembly
5 Spacer (2)
6 Screw, cap, hex-head, 5/16-18 x 1 1/4 in. (2)
7 Nut 5/16-18 (2)
8 Washer, lock, 5/16 in. (2)
9 Clamp assembly
10 Spacer (2)
11 Return tube assembly
12 Tube nut (7)
13 Tube sleeve (7)
14 Tube union
15 Fuel return tube assembly
16 No. 6 cylinder tube assembly
17 No. 5 cylinder tube assembly
19 No. 3 cylinder tube assembly
18 No. 4 cylinder tube assembly
20 No. 2 cylinder tube assembly
21 No. 1 cylinder tube assembly
22 Tube nut (6)
23 Tube sleeve (6)
24 Fuel injection nozzle and holder assembly (6)
25 Fuel injection nozzle dust shield (12)

Figure 3-18. Fuel injection lines, exploded view.

b. Removal. Refer to figure 3-23 and remove the cold weather starting aid.

c. Installation. Refer to figure 3-23 and install the cold weather starting aid.



1 Filler cap
2 Fuel gage
3 Screw, cap, hex-head, 3/8-16 x 1-1/8 in. (3 rqr)
4 Nut, 3/8-16 (3 rqr)
5 Washer, lock, 3/8 in. (3 rqr)
6 Washer, flat, 3/8 in. (3 rqr)
7 Bracket
8 Hose clamp (2 rqr)
9 Hose
10 Filler neck
11 Hose clamp (2 rqr)
12 Hose
13 Tube
14 Screw, cap, hex-head, 7/16-14 x 3/4 in.
15 Washer, lock, 7/16 in.
16 Nut, 7/16-14
17 Clamp
18 Hose assembly
19 Elbow
20 Preformed packing
21 Plug, magnetic
22 Gasket
23 Drain cock
24 Shutoff valve
25 Outlet tube
26 Screw, cap, hex-head, 5/8-11 x 2-1/4 in. (8 rqr)
27 Nut, 5/8-11 (8 rqr)
28 Washer, flat, 5/8 in. (8 rqr)
29 Fuel tank
30 Screw, machine
31 Inlet screen

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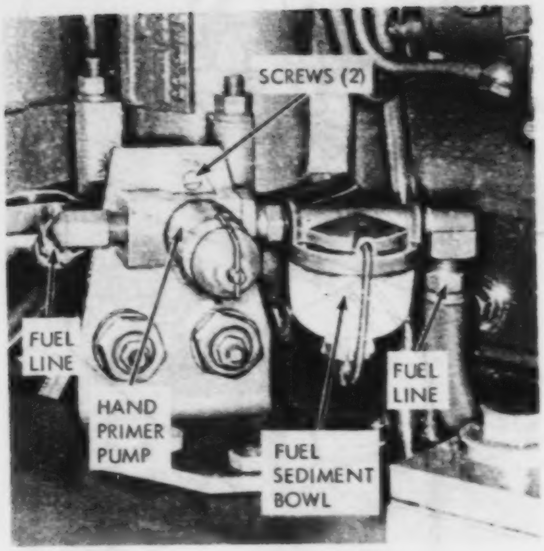
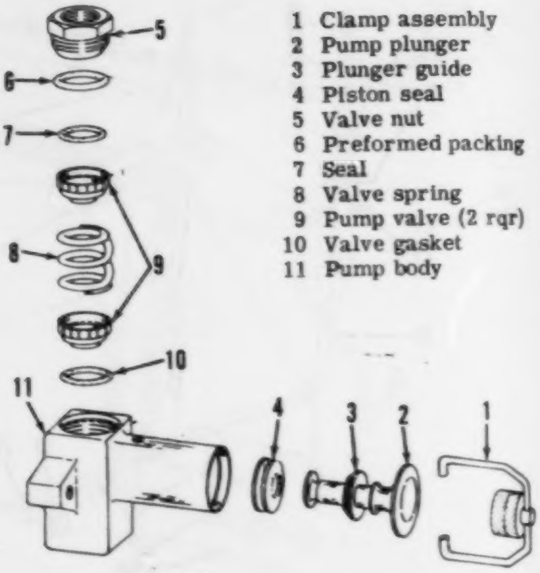
Figure 3-19. Fuel tank and components, exploded view.



STEP 1. DISCONNECT FUEL LINES FROM SEDIMENT BOWL AND PRIMER PUMP.
STEP 2. REMOVE TWO SCREWS, NUTS, AND LOCK WASHERS SECURING HAND PRIMER PUMP TO BRACKET.
STEP 3. REMOVE HAND PRIMER PUMP AND SEDIMENT BOWL FROM BRACKET.
STEP 4. REMOVE SEDIMENT BOWL FROM FITTING IN HAND PRIMER PUMP.

MEC 3805-239-12/3-20

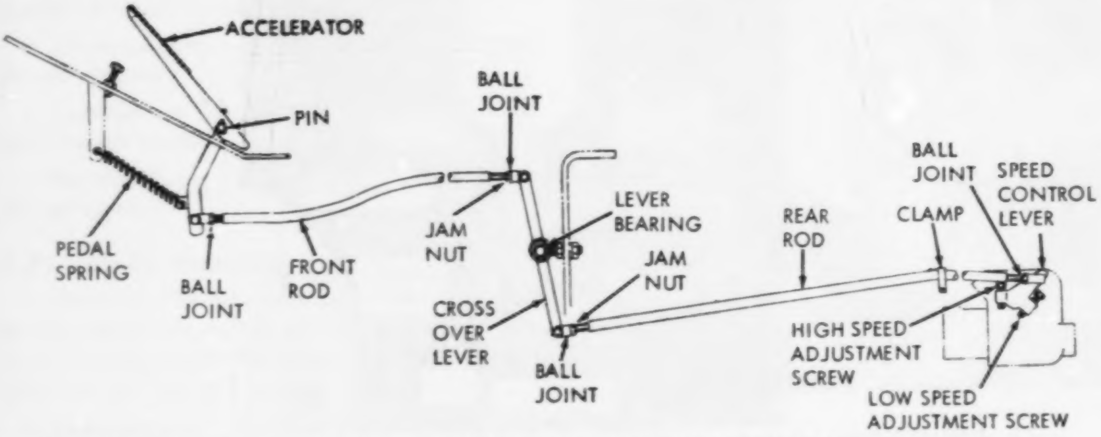
Figure 3-20. Hand primer pump and sediment bowl, removal and installation.



1 Clamp assembly
2 Pump plunger
3 Plunger guide
4 Piston seal
5 Valve nut
6 Preformed packing
7 Seal
8 Valve spring
9 Pump valve (2 rqr)
10 Valve gasket
11 Pump body

MEC 3805-239-12/3-21

Figure 3-21. Hand primer pump, exploded view.

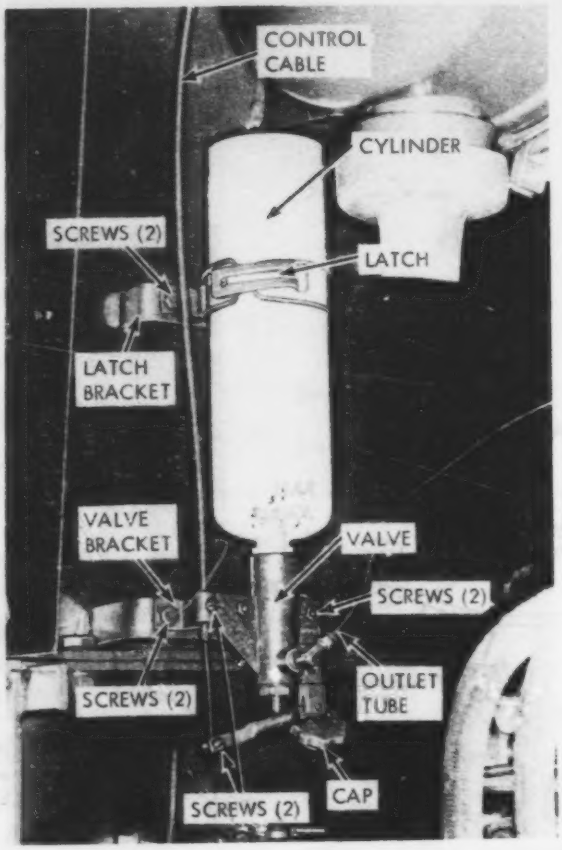


STEP 1. DISCONNECT TWO BALL JOINTS, REMOVE CLAMP, AND REMOVE REAR ROD.
STEP 2. DISCONNECT TWO BALL JOINTS, AND REMOVE FRONT ROD.
STEP 3. REMOVE FOUR NUTS AND LOCK WASHERS, REMOVE TWO LEVER BEARINGS, AND REMOVE CROSS OVER LEVER.
STEP 4. REMOVE TWO COTTER PINS, REMOVE PIVOT PIN, AND REMOVE ACCELERATOR.
STEP 5. REMOVE PEDAL SPRING AND LIMIT CONTROL ROD.

ADJUSTMENT:
STEP 1. WITH REAR ROD DISCONNECTED FROM SPEED CONTROL LEVER, START ENGINE (PAR. 2-12). ROTATE LOW SPEED ADJUSTMENT SCREW IN OR OUT TO SET LOW IDLE SPEED. ROTATE HIGH SPEED ADJUSTMENT SCREW TO SET HIGH IDLE SPEED.
STEP 2. CONNECT REAR ROD TO SPEED CONTROL LEVER. ADJUST LENGTH OF ROD TO HAVE LOW SPEED ADJUSTMENT SCREW AGAINST LEVER STOP WHEN ACCELERATOR IS FULLY RELEASED.

MEC 3805-239-12/3-22

Figure 3-22. Throttle linkage, removal and installation.



STEP 1. REMOVE TWO SCREWS AND DISCONNECT CONTROL CABLE. REMOVE CLAMP FROM TOP OF HYDRAULIC TANK AND CONTROL KNOB (FIG. 2-3) AND REMOVE CABLE.
STEP 2. DISCONNECT LATCH AND UNSCREW CYLINDER FROM VALVE. INSTALL CAP ON VALVE.
STEP 3. DISCONNECT OUTLET TUBE FROM VALVE AND DISCONNECT INJECTOR FROM MANIFOLD. INSTALL PLUG IN MANIFOLD AFTER REMOVING INJECTOR.
STEP 4. REMOVE TWO SCREWS AND NUTS AND REMOVE VALVE FROM VALVE BRACKET.
STEP 5. REMOVE TWO SCREWS AND NUTS AND REMOVE VALVE BRACKET.
STEP 6. REMOVE TWO SCREWS AND NUTS AND REMOVE LATCH AND BRACKET.

MEC 3805-239-12/3-23

Figure 3-23. Cold weather starting aid, removal and installation.

Section IX. AIR SYSTEM

3-50. General

The air system for the engine includes the air cleaner, turbocharger, and intake manifold. Air from the atmosphere is drawn through the air cleaner by the exhaust driven turbocharger. The air is forced under pressure into the intake manifold where it is distributed to the cylinders.

3-51. Air Cleaner

a. General. The air cleaner is mounted on a bracket welded to the hydraulic tank.

b. Removal. Refer to figure 3-24 and remove the air cleaner.

d. Installation. Refer to figure 3-24 and install the air cleaner.

e. Service. Refer to paragraph 3-9 to service the air cleaner.

3-52. Intake Manifold

a. General. The intake manifold is mounted on the right side of the engine. Air from the turbocharger enters the manifold through the turbocharger air outlet elbow.

b. Removal.

(1) Refer to paragraph 3-57 and remove the engine breather tube.

(2) Remove four screws and washers securing air outlet elbow to intake manifold. Loosen hose clamps and remove outlet elbow from turbocharger. Remove elbow gasket.

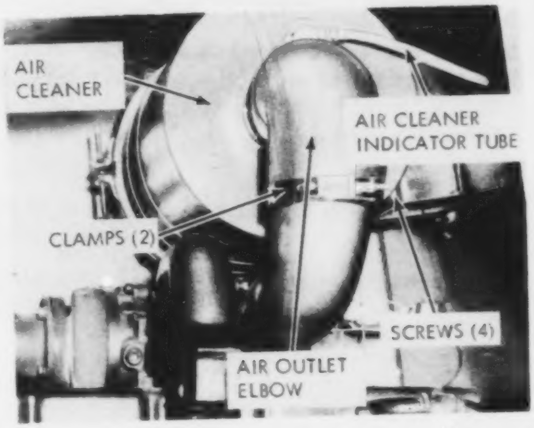
(3) Refer to figure 3-25 and remove the intake manifold.

c. Installation.

.(1) Refer to figure 3-25 and install the intake manifold. Install new manifold gasket.

(2) Install outlet elbow and gasket on intake manifold. Install outlet elbow on turbocharger and tighten hose clamps. Secure outlet elbow to intake manifold with four screws and washers.

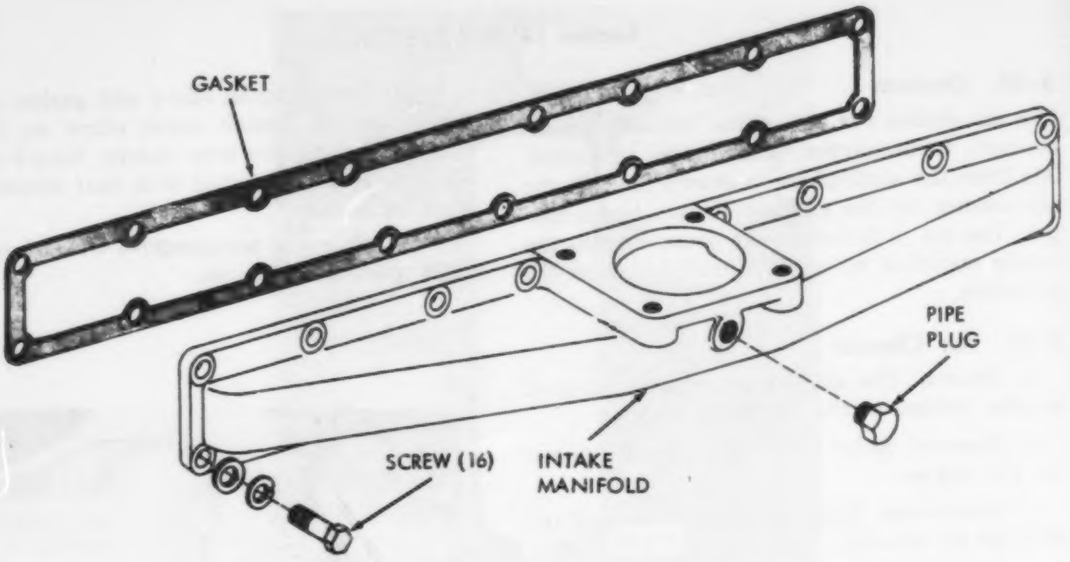
(3) Refer to paragraph 3-57 and install the engine breather tube.



STEP 1. LOOSEN CLAMP AND REMOVE AIR INTAKE TUBE AND CAP FROM TOP OF AIR CLEANER.
STEP 2. DISCONNECT AIR CLEANER INDICATOR TUBE FROM AIR CLEANER.
STEP 3. LOOSEN CLAMPS AND REMOVE AIR OUTLET ELBOW FROM AIR CLEANER.
STEP 4. SUPPORT AIR CLEANER AND REMOVE FOUR SCREWS, NUTS, LOCK WASHERS AND FLAT WASHERS SECURING AIR CLEANER TO BRACKET.
STEP 5. REMOVE AIR CLEANER FROM BRACKET.

MEC 3805-239-12/3-24

Figure 3-24. Air cleaner, removal and installation.



STEP 1. REMOVE 16 SCREWS, LOCK WASHERS, AND FLAT WASHERS SECURING INTAKE MANIFOLD TO ENGINE.
STEP 2. REMOVE INTAKE MANIFOLD. REMOVE PIPE PLUG.
STEP 3. REMOVE AND DISCARD INTAKE MANIFOLD GASKET.

MEC 3805-239-12/3-25

Figure 3-25. Intake manifold, removal and installation.

Section X. EXHAUST SYSTEM

3-53. General

Exhaust gases from the cylinder ports flow through the exhaust manifold and out through the turbocharger turbine housing. Movement of the gas and expansion spins the turbine wheel. The compressor impeller is driven by the turbine wheel shaft. This action increases the inlet air pressure as it is delivered to the cylinders.

3-54. Exhaust Pipe and Turbocharger

a. General. The exhaust pipe is connected to the turbocharger turbine housing outlet and carries the exhaust gases to the atmosphere. A rain cap, attached to the top of the exhaust pipe, keeps water and other foreign material from entering the pipe. The cap also prevents back drafts, due to wind velocity, from spinning the turbine and perhaps damaging the turbocharger. The air is discharged from the turbocharger through an air outlet elbow. The elbow is attached to the turbocharger with a hose and clamps and to the intake manifold. Oil for turbocharger lubrication is supplied from the engine lubrication system. Tube assemblies carry the oil to and from the turbocharger.

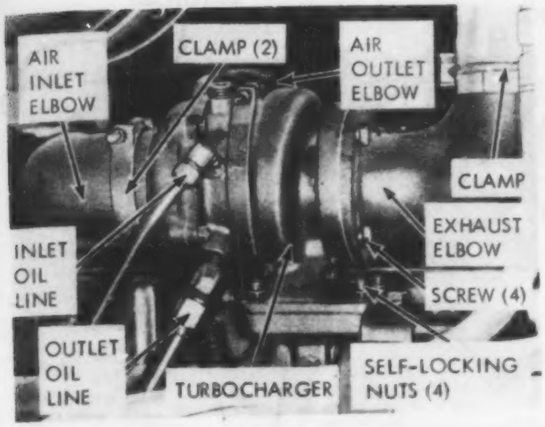
b. Removal.

(1) Disconnect the air compressor air inlet tube from the air outlet elbow (fig. 3-47).

(2) Refer to figure 3-26 and remove the exhaust pipe, air outlet elbow, and oil lines from the turbocharger and remove the turbocharger.

c. Installation.

(1) Refer to figure 3-26 and install the



STEP 1. LOOSEN TWO CLAMPS AND DISCONNECT AIR INLET ELBOW FROM TURBOCHARGER.
STEP 2. LOOSEN TWO CLAMPS AND DISCONNECT AIR OUTLET ELBOW FROM TURBOCHARGER.
STEP 3. LOOSEN CLAMP AND DISCONNECT EXHAUST PIPE FROM EXHAUST ELBOW. REMOVE RAIN CAP FROM TOP OF EXHAUST PIPE.
STEP 4. REMOVE FOUR SCREWS AND REMOVE EXHAUST ELBOW AND GASKET FROM TURBOCHARGER.
STEP 5. DISCONNECT OIL LINES FROM TURBOCHARGER.
STEP 6. REMOVE FOUR SELF-LOCKING NUTS AND FLAT WASHERS SECURING TURBOCHARGER TO EXHAUST MANIFOLD.
STEP 7. REMOVE TURBOCHARGER AND GASKET FROM EXHAUST MANIFOLD.

MEC 3805-239-12/3-26

Figure 3-26. Tubocharger and exhaust pipe, removal and installation.

turbocharger, exhaust pipe, and air outlet elbow.

(2) Tighten screws to a torque of 28 to 33 foot-pounds.

(3) Tighten nuts to a torque of 18 to 21 foot-pounds.

(4) Connect air compressor air inlet tube to the air outlet elbow.

3–55. Exhaust Manifold

a. General. The exhaust manifold is mounted on the left side of the engine and is connected to each cylinder. Exhaust gases are carried through the manifold to the turbocharger and out the exhaust pipe.

b. Removal.

(1) Refer to paragraph 3–54 and remove the turbocharger.

(2) Refer to figure 3-27 and remove the exhaust manifold.

c. Installation.

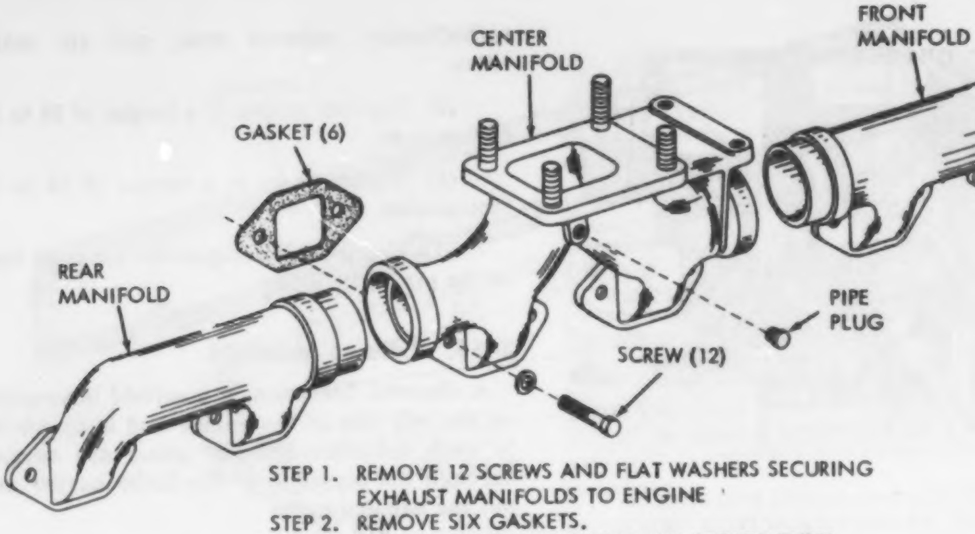
(1) Refer to figure 3–27 and install the exhaust manifold.

(2) Tighten screws to a torque of 68 to 73 foot-pounds.

(3) Refer to paragraph 3–54 and install the turbocharger.

(4) Start engine (para 2–12) and allow engine to reach operating temperature.

(5) Tighten screws again to a torque of 68 to 73 foot-pounds.



STEP 1. REMOVE 12 SCREWS AND FLAT WASHERS SECURING EXHAUST MANIFOLDS TO ENGINE
STEP 2. REMOVE SIX GASKETS.
STEP 3. SEPARATE FRONT AND REAR MANIFOLDS FROM CENTER MANIFOLD.
STEP 4. REMOVE PIPE PLUG FROM CENTER MANIFOLD.

MEC 3805-239-12/3-27

Figure 3-27. Exhaust manifold, removal and installation.

Section XI. LUBRICATION SYSTEM

3-56. General

a. The engine lubricating system is designed to provide pressure lubrication to all parts of the engine at any 45° angle the loader is required to operate. Normal operating oil pressure is 15 psi at low idle (650 to 700 rpm) and from 30 to 55 psi at full throttle.

b. The system consists of an oil pan to store the oil, a gear driven oil pump, an oil cooler, and hoses and tubes to circulate the oil. Oil is circulated within the engine through galleries in the cylinder block. Tubes leading to the air compressor and turbocharger carry oil to these components for lubrication.

3-57. Engine Breather Pipe

a. General. The breather pipe leads from the valve cover along the right side of the engine and exhausts below the engine starter.

b. Removal.

(1) Remove intake manifold screw securing clamp at top of tube to engine.

(2) Refer to figure 3-28 and remove the engine breather tube.

c. Installation.

(1) Refer to figure 3-28 and install the engine breather tube.

(2) Secure clamp at top of tube with intake manifold screw and washer.

3-58. Oil Filters

a. Removal. Refer to figure 3-29 and remove oil filter from engine.

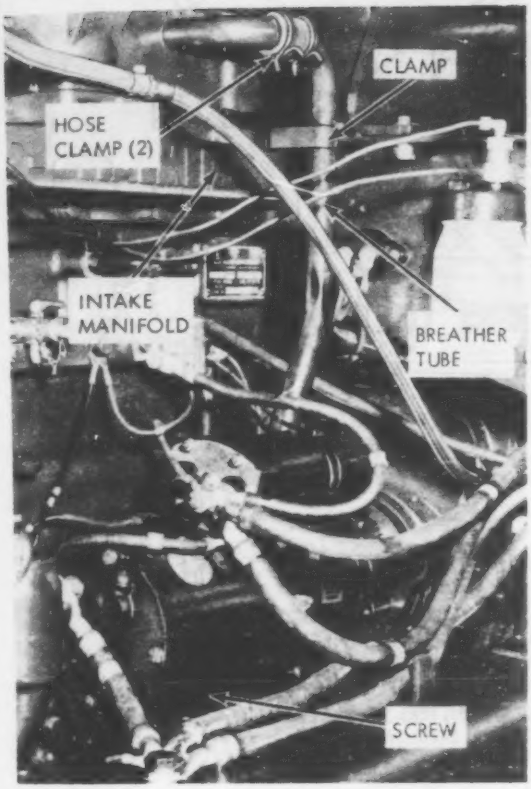
b. Installation.

(1) Refer to figure 3-29 and install oil filters.

(2) Remove covers from oil filters and fill filters with oil.

(3) Start engine (para 2-12) and operate for 15 minutes.

(4) Check filters while engine is running for any evidence of leakage. If leaks are pre-



STEP 1. REMOVE SCREW AND WASHER SECURING CLAMP AT TOP OF BREATHER TUBE TO INTAKE MANIFOLD.
STEP 2. REMOVE SCREW, NUT, AND WASHER SECURING CLAMP AT LOWER END OF BREATHER TUBE TO BRACKET ON OIL PAN.
STEP 3. LOOSEN TWO HOSE CLAMPS AND REMOVE BREATHER TUBE AND HOSE FROM CYLINDER HEAD COVER. REMOVE CLAMPS FROM BREATHER TUBE.

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Figure 3-28. Breather tube, removal and installation.

sent, tighten fittings if necessary. Stop engine (para 2-13).

(5) Allow a few minutes for oil to drain into pan. Check oil level on oil gage and add oil if necessary.

3-59. Oil Cooler

a. General. The oil cooler is a dual assembly, cooling the engine and transmission oil in separate compartments. Coolant from the water pump enters the top of the cooler, flows through the oil cooler, and into the engine water passages.

b. Removal.

(1) Refer to paragraph 3-62 and drain the cooling system.

(2) Refer to paragraph 3-71 and remove the transmission oil hoses from the oil cooler.

(3) Refer to paragraph 3-48 and disconnect throttle linkage rod from fuel injection pump.

(4) Refer to paragraph 3-54 and remove turbocharger oil drain line from turbocharger and cylinder block.

(5) Remove screws (1, 3, and 4, fig. 3-30) and lock washers (2 and 5).

(6) Pull or tap oil cooler (7) toward rear of engine to free cooler from coolant tube (10) and remove oil cooler.

(7) Discard packings (8, 9, and 11).

c. Installation.

(1) Clean all mounting surfaces thoroughly.

(2) Install new preformed packings (8 and 9, fig. 3-30) in recesses on oil cooler.

(3) Install oil cooler on engine, with coolant tube entering elbow at top of oil cooler. Tap cooler in place and aline mounting holes in cooler with holes in engine block.

(4) Install screws (1, 3, and 4) with lock washers (2 and 5) and secure oil cooler to engine block.

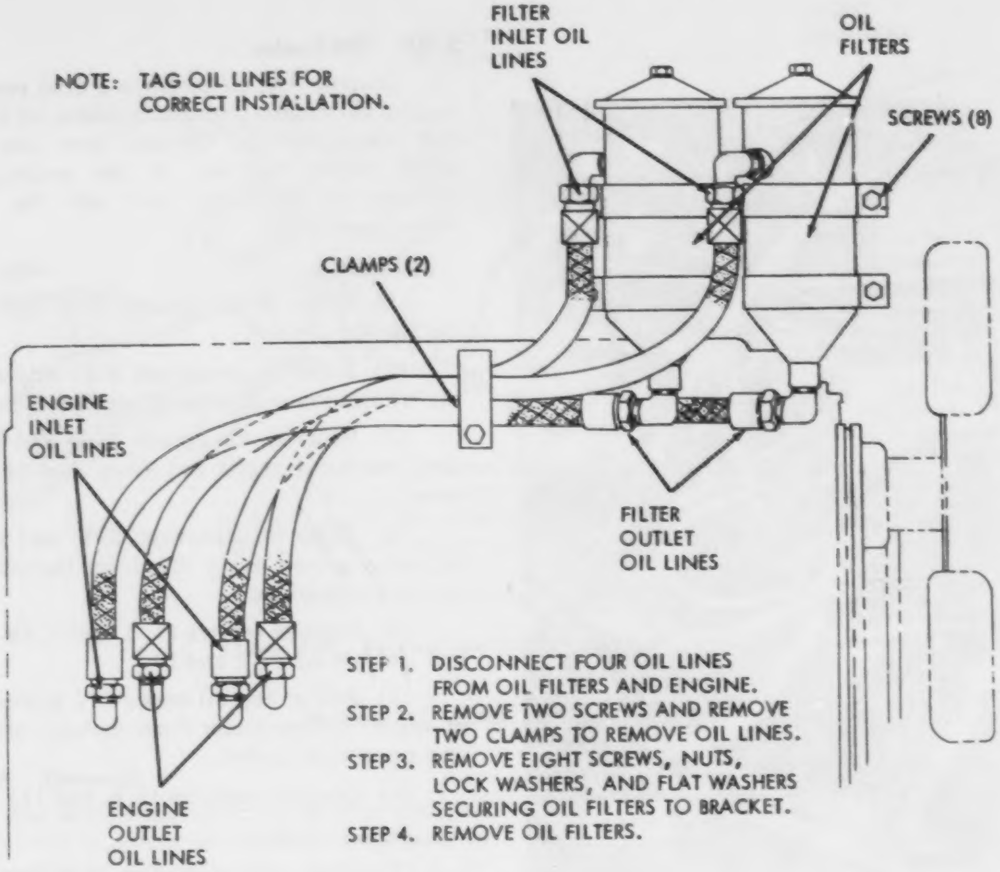
(5) Refer to paragraph 3-54 and install turbocharger oil drain hose.

(6) Refer to paragraph 3-71 and install transmission oil hoses on oil cooler.

(7) Refer to paragraph 3-48 and install throttle linkage.

(8) Refer to paragraph 3-62 and fill the engine cooling system.

(9) Start engine (para 2-12) and operate engine at fast idle.



NOTE: TAG OIL LINES FOR CORRECT INSTALLATION.

STEP 1. DISCONNECT FOUR OIL LINES FROM OIL FILTERS AND ENGINE.
STEP 2. REMOVE TWO SCREWS AND REMOVE TWO CLAMPS TO REMOVE OIL LINES.
STEP 3. REMOVE EIGHT SCREWS, NUTS, LOCK WASHERS, AND FLAT WASHERS SECURING OIL FILTERS TO BRACKET.
STEP 4. REMOVE OIL FILTERS.

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Figure 3-29. Oil filters, removal and installation.

(10) Check oil cooler for oil and water leaks. Correct any leaks.

(11) Check engine coolant level (para 3-62) and add coolant if necessary.

3-60. Oil Pressure Regulating Valve

a. General. The oil pressure regulating valve is located in the main oil gallery adjacent to the fuel filter. The valve maintains a stabilized oil pressure in the lubrication system. When oil pressure at the valve exceeds 50 psi the piston is raised off its seat and allows oil to flow directly from the block to the oil pan.

b. Removal.

(1) Clean area of cylinder block around the valve.

(2) Refer to figure 3-31 and remove the regulating valve from the cylinder block.

c. Installation.

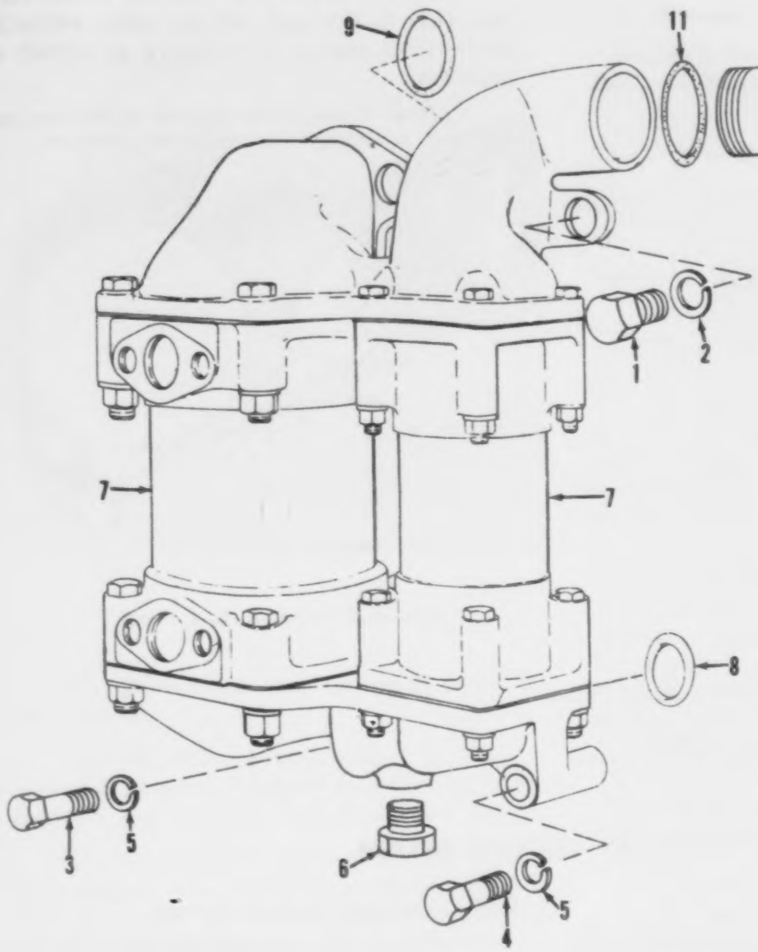
(1) Clean valve bore in cylinder block and lubricate piston with engine oil (OE).

(2) Refer to figure 3-31 and install oil pressure regulating valve.

d. Adjustment.

(1) Start engine (para 2-12) and allow to operate at fast idle speed until engine reaches normal operating temperature.

(2) Check engine oil pressure gage (fig. 2-3). Gage should read from 30 to 55 psi at full throttle.



1 Screw, cap, hex-head, 1/2-13 x 1-3/8 in. (3 rqr)
2 Washer, lock, 1/2 in. (3 rqr)
3 Screw, cap, hex-head, 7/16-14 x 1-1/4 in.
4 Screw, cap, hex-head, 7/16-14 x 3 in. (2 rqr)
5 Washer, lock, 7/16 in. (3 rqr)
6 Pipe plug
7 Oil cooler
8 Preformed packing (2 rqr)
9 Preformed packing
10 Coolant tube
11 Preformed packing (4 rqr)

MEC 3805-239-12/3-30

Figure 3-30. Oil cooler, removal and installation.

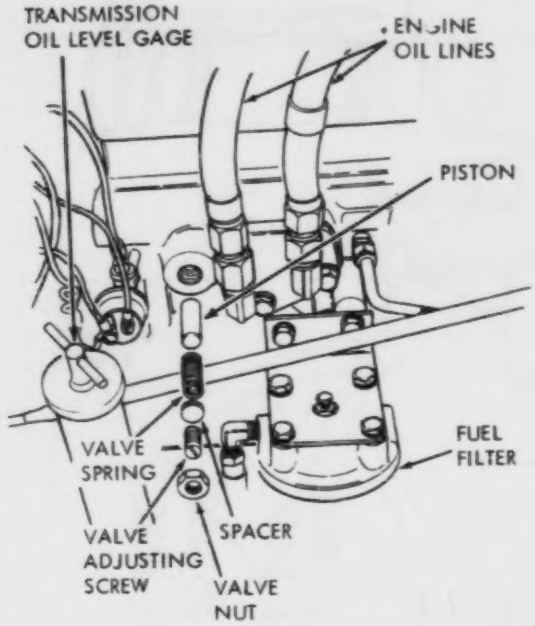


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Figure 3-31. Oil pressure regulating valve, removal and installation.

(3) If pressure is not correct loosen valve nut (fig. 3-31) and adjust valve adjusting screw until engine is operating at correct oil pressure.

Note. Rotate screw clockwise to increase pressure and counterclockwise to decrease pressure.

Section XII. COOLING SYSTEM

3-61. General

a. The engine cooling system consists of the cooling fan, radiator, water pump, thermostat, oil cooler, engine temperature gage, and water passages in the cylinder block and cylinder head. Coolant from the radiator is circulated by the water pump, through the oil cooler and into the engine block. The coolant passes through the block and cylinder head and out through the thermostat housing. If the engine has not reached operating temperature the thermostat will bypass the coolant to the radiator outlet pipe and back through the water pump and through the engine.

b. When the engine reaches operating temperature the thermostat will open up and allow coolant to flow to the top of the radiator. As the coolant flows through the radiator it is cooled by a stream of air drawn across the radiator by the fan.

3-62. Cooling System Service

a. Draining the Cooling System.

Note. Before draining, park loader on level ground to insure complete drainage.

(1) Remove the radiator cap and open the drain cock located on the right side of the cylinder block behind the starter. Open the drain cock in the radiator outlet elbow (fig. 3-32).

(2) Open drain cock in air compressor cylinder head.

(3) Remove pipe plug (fig. 3-30) and drain oil cooler.

b. Filling the Cooling System.

(1) Close radiator drain cock (fig. 3-32).

(2) Close drain cock in air compressor cylinder head.

(3) Install pipe plug (6, fig. 3-30) in oil cooler.

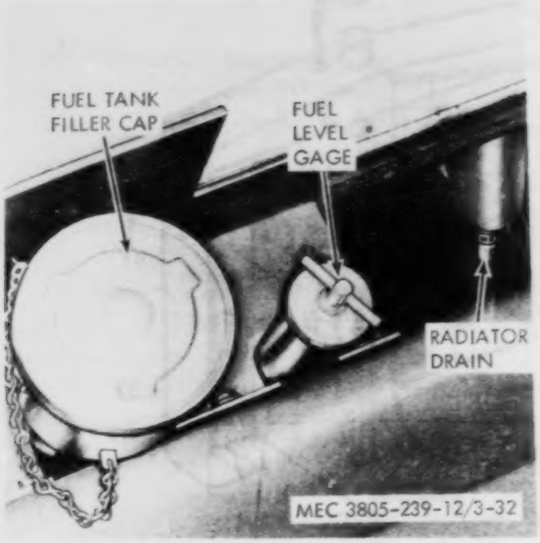


Figure 3-32. Radiator drain cock.

(4) Close drain cock in engine block behind starter.

(5) Fill radiator with proper coolant for expected ambient temperatures to within one inch of top of radiator. Install radiator cap.

(6) Start engine (para 2–12) and operate until engine has reached operating temperature. Continue operating engine for approximately ten minutes to vent all air from system. Stop engine (para 2–13).

(7) Remove radiator cap and fill radiator to bring coolant level to within one inch of top of radiator. Install radiator cap.

c. Cleaning Cooling System. Drain system at least twice a vear. Clean system before installing antifreeze and when antifreeze is drained at the end of the cold weather season. Flush radiator with clean water or a good commercial solvent.

3–63. Radiator

a. General. The radiator is of the fin and tube type and is mounted on at the rear end of the loader. A radiator support mounts the radiator and rubber washers are used to reduce vibration and shock.

b. Removal.

(1) Refer to paragraph 3–61 and drain the cooling system.

(2) Refer to paragraph 3–42 and remove the radiator grill.

(3) Refer to figure 3–33 and remove the radiator from the rear of the loader.

Note. Remove radiator carefully to prevent damage to fuel tank filler pipe and fan.

c. Installation.

(1) Refer to figure 3–33 and install the radiator.

(2) Refer to paragraph 3–42 and install the radiator grill.

(3) Refer to paragraph 3–61 and fill the cooling system.

3–64. Fan Belts

a. General. The cooling fan is mounted on the water pump drive shaft. Protection for the fan is supplied by the fan guard and shrouds. A pulley, to which the fan is attached is driven by two belts from the crankshaft pulley (fig. 3–34). The belts also drive the generator (alternator) pulley. Adjustment for the belts is provided by moving the generator on the adjusting bracket.

b. Removal.

(1) Refer to paragraph 3–63 and remove the fan guard from the radiator shroud.

(2) Refer to paragraph 3–79 and remove the compressor drive belt.

(3) Loosen screw securing generator to the adjusting bracket (fig. 3–34) and push generator toward engine and remove belts from generator pulley.

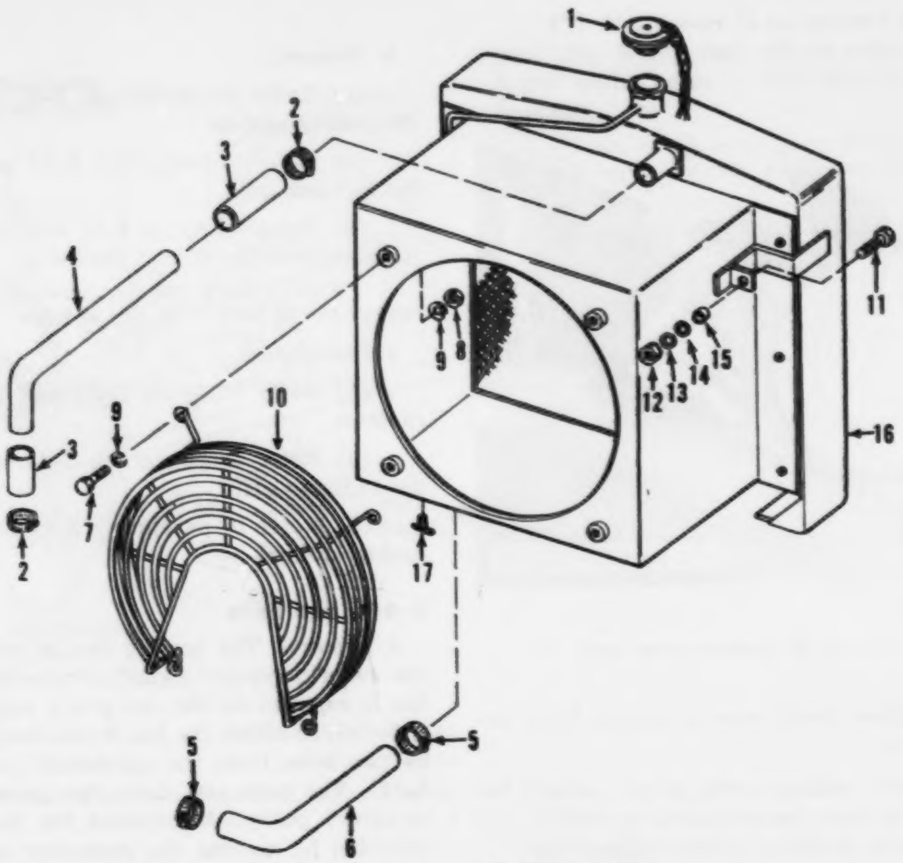
(4) Slip belts from water pump pulley and crankshaft pulley and remove belts from around fan.

c. Installation.

(1) Install fan belts around fan and in grooves of crankshaft pulley, water pump pulley, and generator pulley.

Note. Install fan belts as a set. If one requires replacement, both belts must be replaced.

(2) Refer to paragraph 3–11 and adjust fan belt tension.



1 Radiator cap
2 Hose clamp (8 rqr)
3 Hose (2 rqr)
4 Radiator inlet tube
5 Hose clamp (2 rqr)
6 Radiator outlet hose
7 Screw, cap, hex-head, 3/8-16 x 1-1/2 in. (4 rqr)
8 Nut, 3/8-16 (4 rqr)
9 Washer, flat, 3/8 in. (6 rqr)
10 Fan guard
11 Screw, cap, hex-head, 1/2-13 x 2-1/4 in. (4 rqr)
12 Nut, self-locking, 1/2-13 (4 rqr)
13 Washer, flat, 1/2 in. (4 rqr)
14 Washer, flat, 1/2 in. (4 rqr)
15 Resilient mount (4 rqr)
16 Radiator
17 Drain plug

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Figure 3-33. Radiator and fan guard, removal and installation.

(3) Refer to paragraph 3-79 and install the compressor drive belt.

(4) Refer to figure 3-33 and install the fan guard.

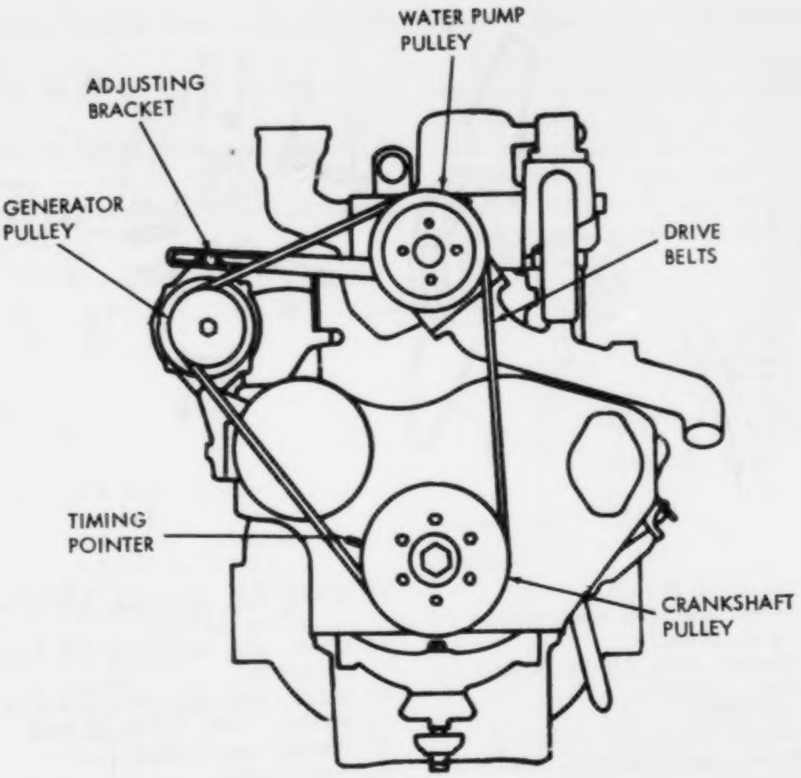
3-65. Cooling Fan

a. Removal.

(1) Refer to paragraph 3-64 and remove the fan belts.

(2) Refer to figure 3-33 and remove fan guard.

(3) Refer to figure 3-35 and remove fan and pulley (items 1 through 6).



MEC 3805-239-12/3-34

Figure 3-34. Fan and generator (alternator) drive belts.

b. Installation.

(1) Refer to figure 3-35 and install the fan and pulley. Tighten screws (2) to a torque of 43 to 48 foot-pounds.

(2) Refer to figure 3-33 and install fan guard.

(3) Refer to paragraph 3-64 and install the fan belts.

3-66. Water Pump

a. General. The centrifugal type water pump circulates the coolant through the engine. The pump is mounted on the front of the cylinder block. Coolant from the radiator enters the bottom of the pump and is forced out to the oil cooler with a portion of the coolant going direct to the cylinder block. A bypass hose from the thermostat is connected to the water pump inlet pipe to allow recirculation of the coolant through the engine until the engine reaches operating temperature.

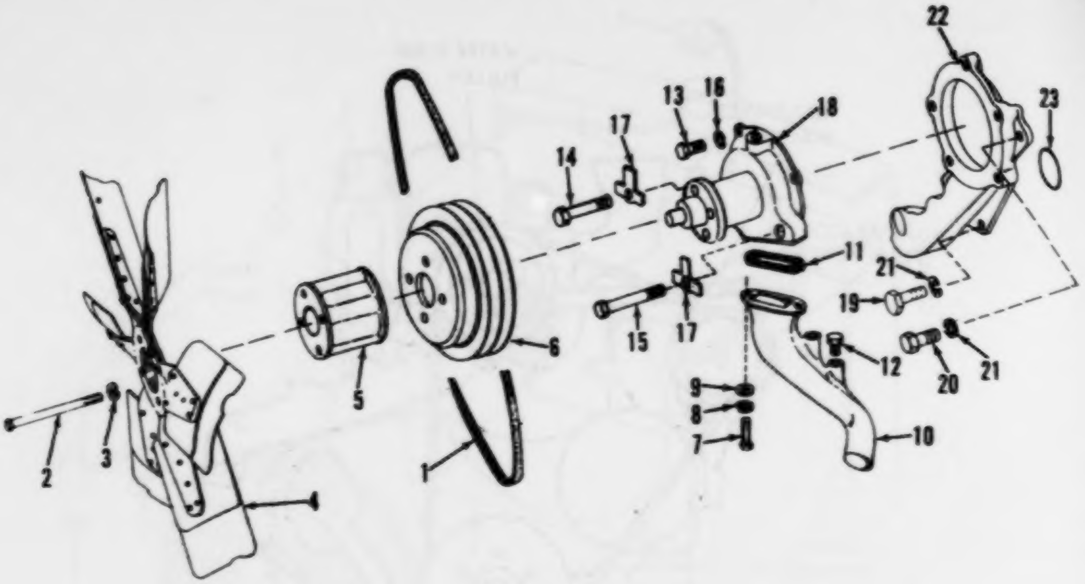
b. Removal.

(1) Refer to paragraph 3-64 and remove the fan belts.

(2) Refer to figure 3-33 and remove fan guard.

(3) Refer to paragraph 3-65 and remove fan.

(4) Loosen clamps and disconnect bypass



1 Drive belt (2 rqr)
2 Screw, cap, hex-head, 3/8-24 x 4 in. (4 rqr)
3 Washer, lock, 3/8 in. (4 rqr)
4 Fan
5 Fan spacer
6 Pulley
7 Screw, cap, hex-head, 3/8-16 x 1-1/2 in. (2 rqr)
8 Washer, lock, 3/8 in. (2 rqr)
9 Washer, flat, 3/8 in. (2 rqr)
10 Water inlet pipe
11 Gasket
12 Pipe plug
13 Screw, cap, hex-head, 3/8-16 x 1-1/8 in. (3 rqr)
14 Screw, cap, hex-head, 3/8-16 x 3-1/4 in.
15 Screw, cap, hex-head, 3/8-16 x 2 in.
16 Washer, lock, 3/8 in. (3 rqr)
17 Washer, tab (2 rqr)
18 Water pump
19 Screw, cap, hex-head, 3/8-16 x 1-1/8 in. (2 rqr)
20 Screw, cap, hex-head, 3/8-16 x 2 in.
21 Washer, lock, 3/8 in. (3 rqr)
22 Water outlet
23 Preformed packing

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Figure 3-35. Fan and water pump removal and installation.

hose from water pump inlet pipe (10) figure 3-35.

(5) Loosen clamps and disconnect air compressor coolant outlet hose from top of water pump.

(6) Refer to figure 3-35 and remove water inlet pipe from water pump. Discard gasket.

(7) Remove water pump (18) and water outlet (22) from engine. Discard preformed packing (23).

c. Installation.

(1) Refer to figure 3-35 and install water outlet (22), water pump (18), and water inlet pipe (10) on engine.

(*a*) Tighten screws (19 and 20) to a torque of 28 to 33 foot-pounds.

(*b*) Tighten screws (13, 14, and 15) to a torque of 28 to 33 foot-pounds.

(*c*) Tighten screws (2) to a torque of 28 to 33 foot-pounds.

(2) Connect air compressor coolant outlet hose to top of water pump.

(3) Connect bypass hose to water inlet pipe (10).

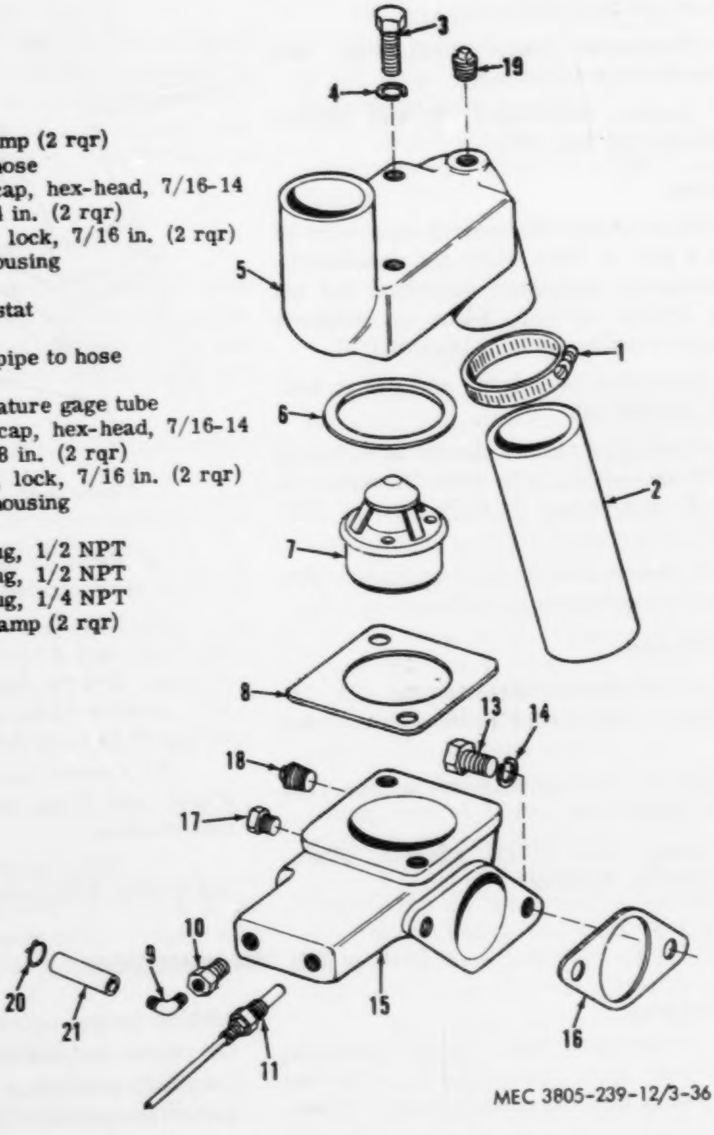
(4) Refer to paragraph 3-65 and install fan.

(5) Refer to figure 3-33 and install fan guard.

(6) Refer to paragraph 3-64 and install fan belts.

3-67. Thermostat and Housing

a. General. The thermostat is enclosed in a housing connected to the coolant outlet of the cylinder head behind the air compressor. Coolant flowing from the head is bypassed directly to the water pump until the temperature reaches 180 °F. At this temperature the thermostat opens to allow coolant to flow to the ra-



1 Hose clamp (2 rqr)
2 Bypass hose
3 Screw, cap, hex-head, 7/16-14 x 3-1/4 in. (2 rqr)
4 Washer, lock, 7/16 in. (2 rqr)
5 Upper housing
6 Seal
7 Thermostat
8 Gasket
9 Elbow, pipe to hose
10 Adapter
11 Temperature gage tube
13 Screw, cap, hex-head, 7/16-14 x 1-1/8 in. (2 rqr)
14 Washer, lock, 7/16 in. (2 rqr)
15 Lower housing
16 Gasket
17 Pipe plug, 1/2 NPT
18 Pipe plug, 1/2 NPT
19 Pipe plug, 1/4 NPT
20 Hose clamp (2 rqr)
21 Hose

Figure 3-36. Thermostat and housing, exploded view.

diator. A hose leading from the housing carries coolant to the air compressor to cool the compressor head.

b. Removal.

(1) Refer to paragraph 3-62 and drain the cooling system.

(2) Disconnect radiator inlet hose (3, fig. 3-33) from top of thermostat housing.

(3) Loosen clamps (1, fig. 3-36) and remove bypass hose (2) from housing.

(4) Disconnect air compressor inlet hose from elbow (9, fig. 3-36).

(5) Disconnect temperature gage tube (11) from thermostat housing.

(6) Remove thermostat (7) and thermostat housings (5) and (15).

c. Testing.

(1) Suspend the thermostat on a wire or string in a pan of clean water set on a heater. Keep thermostat completely immersed but not touching bottom of pan. Place an accurate thermometer reading up to at least 220° F.

(2) Gradually heat water and stir so heat is evenly distributed.

(3) Check thermostat closely as it begins to open. It should begin to open between 175 and 182° F. and should be fully open at 202° F.

(4) If thermostat does not operate within the above limits, replace thermostat.

d. Installation.

(1) Install thermostat housing (15, fig. 3-36) with a new gasket (16) on cylinder head.

(2) Secure housing with two screws (13) and lock washers (14).

(3) Install pipe plugs, adapter, elbow, and gage tube in housing.

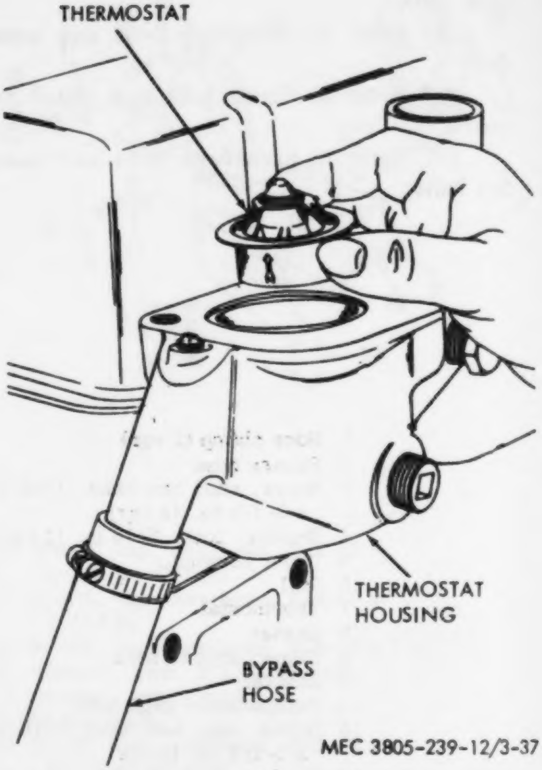


Figure 3-37. Installing thermostat.

(4) Refer to figure 3-37 and install thermostat as illustrated, with arrow pointing up.

(5) Install upper thermostat housing (5, fig. 3-36) and a new gasket (8) on thermostat housing. Secure flange with screws (3) and lock washers (4) and tighten screws to a torque of 44 to 49 foot-pounds.

(6) Connect air compressor inlet hose, radiator inlet hose, and bypass hose to thermostat housing.

(7) Refer to paragraph 3-62 and fill cooling system with proper coolant.

Section XIII. TRANSMISSION

3-68. General

a. The transmission has a torque converter, planetary gear type, transmission, with two speeds forward and one speed reverse. A two-turbine torque converter is directly driven by the engine and is coupled by gears to a forward planetary gear set, a reverse gear set, and a direct drive clutch. The driven elements of the three units are connected to output transfer gears which drive output shafts extending from the front and rear of a transfer case mounted in the lower section of the transmission housing.

b. The two output shafts drive propeller shafts connected to the front and rear axle differentials. The differentials in turn drive the planetaries in the four wheels. A parking brake is installed on the front output shaft for use in keeping the loader motionless when parked.

c. Gear range selection for the transmission is controlled by a single manual control. The control has four positions, high forward (LF), high forward (HF), reverse, and neutral. Low forward is low range forward, high forward is high range forward.

3–69. Transmission Control Linkage

a. General. The transmission control lever extends on the left side of the steering wheel. A linkage from the lever extends down and connects to the control valve on the right side of the transmission housing.

b. Removal. Refer to figure 3–38 and remove the transmission linkage.

c. Installation. Refer to figure 3–38 and install the transmission control linkage.

d. Adjustment.

(1) Place control lever in neutral position. Check selector valve plunger position on transmission. Plunger should be in neutral position with vertical member of cross-over lever (49, fig. 3–38) in straight up and down position.

(2) Adjust length of rods to maintain this position.

(3) Shift control lever through all gear ranges to be positive the selector valve is in the full detent position for each range. Adjust rods and ball joints as necessary to provide proper transmission operation.

3–70. Transmission Service

a. General. The transmission oil sump contains a strainer through which the oil flows to be cleaned. The strainer should be serviced every time the oil is changed (every 1000 hours of operation). Remove and clean the breather periodically, depending upon dust conditions in the area of operation.

Caution: **After the drain plug has been removed from the transmission to allow the oil to drain, the engine should never be started when the transmission is empty. Serious damage to the pump and converter would result due to the lack of lubrication.**

b. Service.

(1) ***Breather.***

(*a*) Clean the breather and area around it and remove the breather (1, fig. 3–39) from the transmission housing.

(*b*) Clean the breather in cleaning compound, solvent (Spec. P–S–661) and dry thoroughly.

(*c*) Install breather in transmission housing.

(*d*) Do not damage breather while removing or installing.

(2) *Strainer.*

(*a*) Start engine (para 2–12) and operate until transmission temperature gage (fig. 2–2) reaches operating temperature (approximately 180° F.). Stop engine (para 2–13).

(*b*) Remove drain plug (2, fig. 3–39) and allow oil to drain from transmission.

(*c*) Allow approximately 30 minutes for the oil to drain completely.

Note. Refer to paragraph 3–10 and service the transmission oil filter.

(*d*) Remove six screws (3, fig. 3–39) and lock washers (4). Remove strainer (5) and gasket (6). Discard gasket.

(*e*) Clean strainer in cleaning compound, solvent (Spec. P–S–661) and dry thoroughly with compressed air.

(*f*) Install strainer (5), with a new gasket (6) on transmission housing. Strainer is offset on flange and must be toward bottom of transmission. Interior end of strainer must slip over end of oil pickup tube in sump.

(*g*) Secure strainer with six screws (3) and lock washers (4).

(*h*) Install drain plug (2).

(*i*) Fill transmission with proper grade of oil (refer to Lubrication Order, para 3–4).

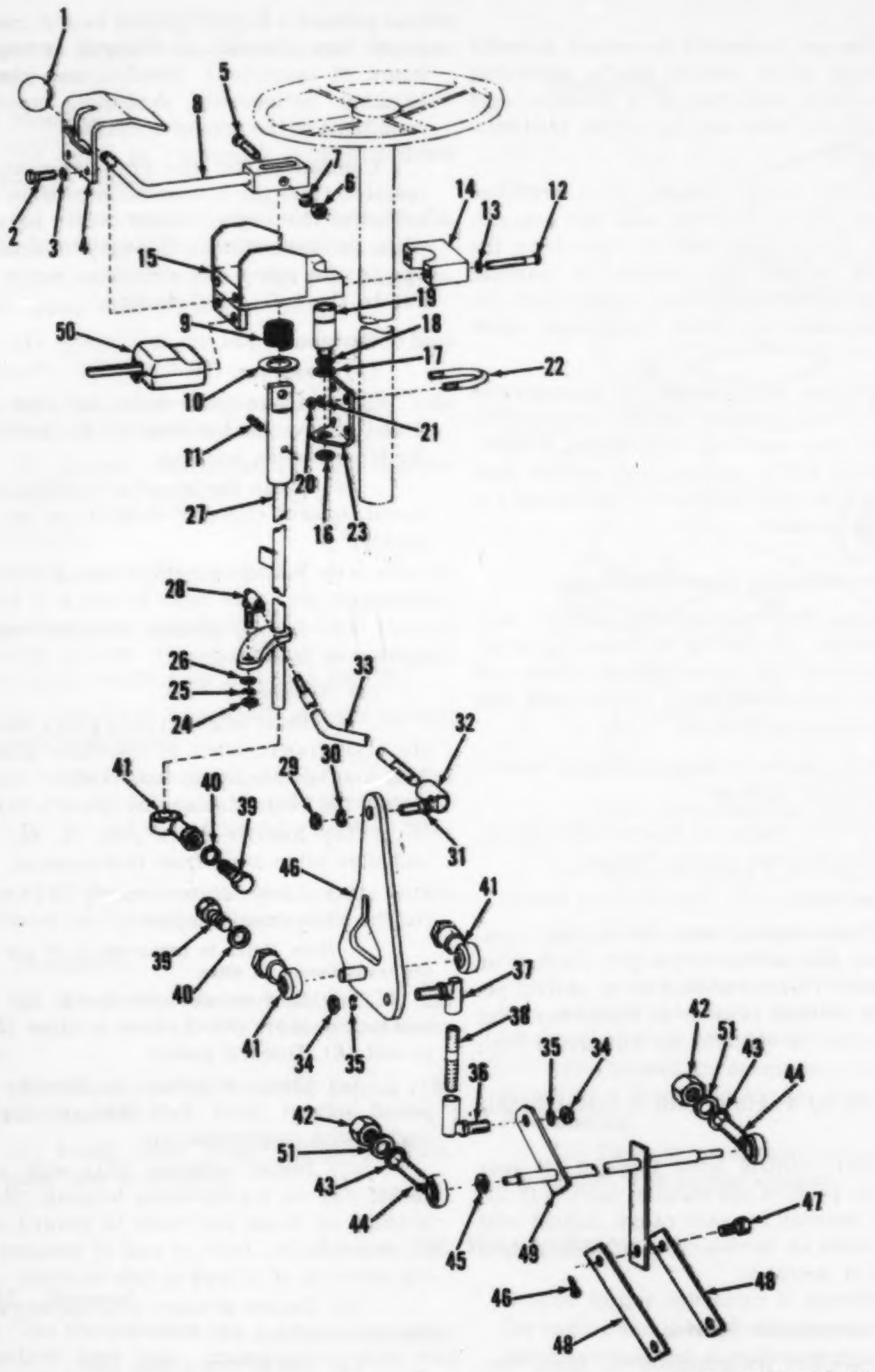


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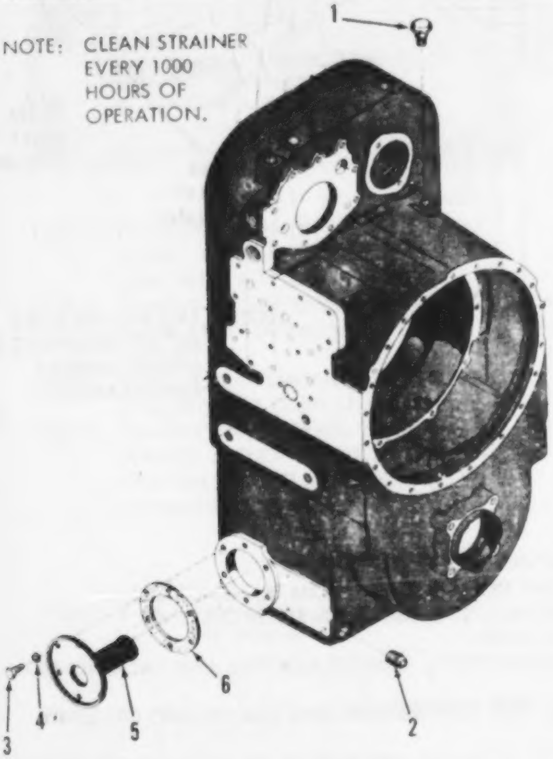
Figure 3-38. Transmission control linkage, exploded view.

Figure 3–38—Continued.

1 Knob
2 Screw, cap, hex-head, ⅜–24 x ¾ in. (2)
3 Washer, lock, ⅜ in. (2)
4 Mounting plate
5 Screw, cap, hex-head, ⅜–24 x 2 i
6 Nut, ⅜–24
7 Washer, lock, ⅜ in.
8 Control lever
9 Return spring
10 Washer, flat
11 Spring pin
12 Screw, cap, hex-head, ⅜–24 x 2½ in. (2)
13 Washer, lock, ⅜ in. (2)
14 Clamp support
15 Clamp
16 Nut
17 Washer
18 Nut
19 Starting switch
20 Nut, ⅜–24 (4)
21 Washer, lock, ⅜ in. (4)
22 U bolt (2)
23 Mounting bracket
24 Nut, ⅜–24
25 Nut, jam, ⅜–24
26 Washer, lock, ⅜ in.
27 Control rod
28 Ball joint
29 Nut, ⅜–24
30 Washer, lock, ⅜ in.
31 Nut, jam, ⅜–24
32 Ball joint
33 Connecting rod
34 Nut, ⅜–24 (4)
35 Washer, lock, ⅜ in. (4)
36 Nut, jam, ⅜–24 (4)
37 Ball joint (4)
38 Connecting rod
39 Screw, cap, hex-head, ⅝–18 x 1¼ in. (2)
40 Washer, lock, ⅝ in. (2)
41 Rod end bearing (2)
42 Nut, ⅝–24 (2)
43 Washer, lock, ⅝ in. (2)
44 Rod end bearing (2)
45 Washer (2)
46 Pin, cotter, 3/32 x 3/4 in. (2)
47 Pin (2)
48 Link (2)
49 Cross-over lever
50 Directional light control
51 Washer, flat (2)



NOTE: CLEAN STRAINER EVERY 1000 HOURS OF OPERATION.

1 Transmission breather
2 Drain plug
3 Screw, cap, hex-head, 3/8-16 x 7/8 in. (6 rqr)
4 Washer, lock, 3/8 in. (6 rqr)
5 Strainer
6 Gasket

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Figure 3–39. Transmission service.

Note. **Cold oil level check. Before starting engine—check oil level on dipstick located in the oil filler tube (1, fig. 3–40). With oil level at or above the upper mark, sufficient oil is in the transmission to permit starting the engine.**

(*j*) Start engine (para 2–12) and operate for two minutes at 1000 to 1500 rpm to fully charge all oil lines and circuits. With the engine idling, check the oil level. Add specified oil, as necessary, to bring level to lower mark on the dipstick.

Note. Hot oil level check.

(*k*) Start engine and operate until transmission oil temperature gage indicates approximately 180° F.

(*l*) With oil at normal operating temperature, engine operating at low idle, transmission in neutral and parking brake set, check the oil level. The level should be within "operating range" and *not* exceed the upper mark on the dipstick. If level is below the lower mark, add specified oil to bring within operating range. One quart equals approximately ½ inch level change.

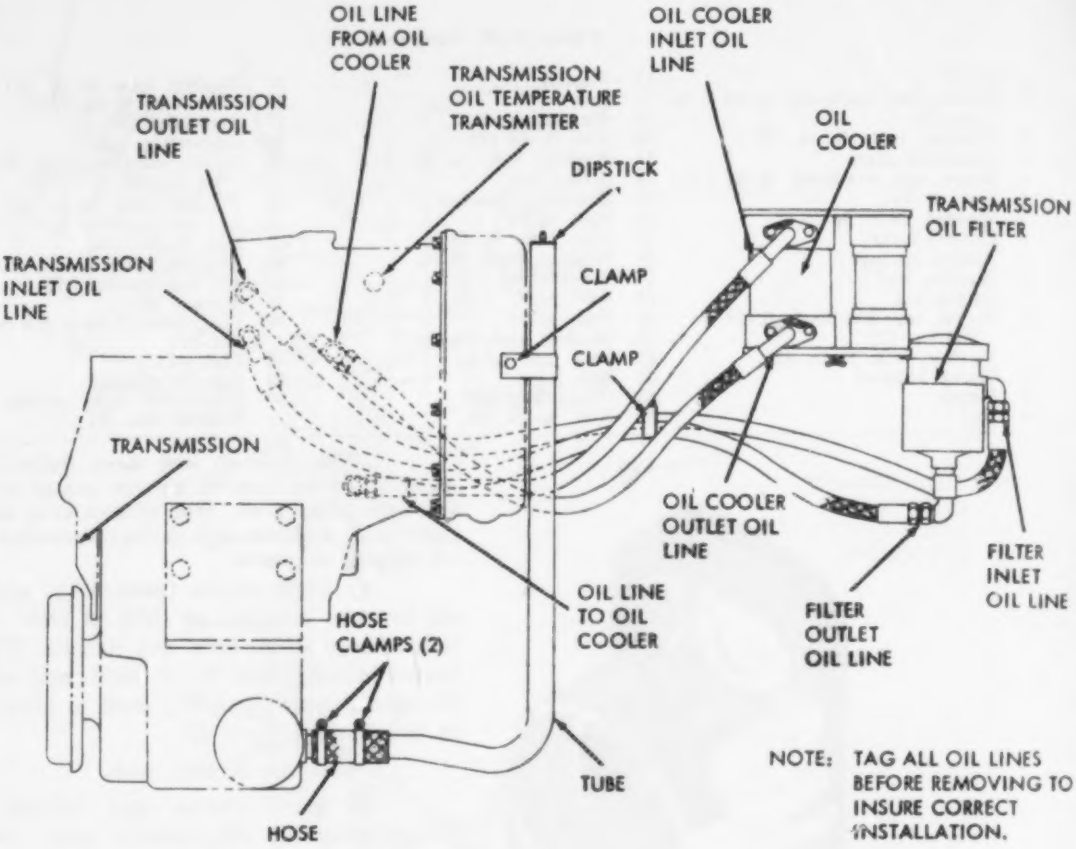
3–71. Transmission Oil Lines

a. General. The transmission oil is cooled by the transmission oil cooler. The oil is carried to and from the cooler through the oil lines. Oil also flows through the transmission oil filter to be filtered.

b. Removal.

(1) Refer to paragraph 3–70 and drain the transmission.

(2) Clean all oil lines and fittings before removal.

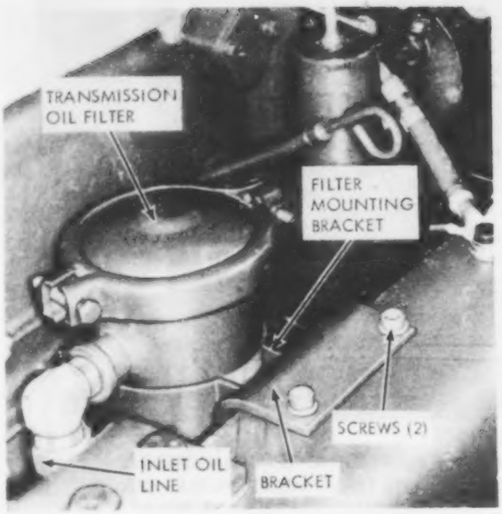


NOTE: TAG ALL OIL LINES BEFORE REMOVING TO INSURE CORRECT INSTALLATION.

STEP 1. REMOVE DIPSTICK FROM TUBE.
STEP 2. REMOVE SCREW AND REMOVE CLAMP FROM TUBE.
STEP 3. LOOSEN TWO HOSE CLAMPS AND REMOVE HOSE AND TUBE FROM TRANSMISSION.
STEP 4. REMOVE SCREW AND LOCK WASHER AND REMOVE CLAMP FROM FILTER OIL LINES.
STEP 5. DISCONNECT TWO OIL LINES FROM OIL FILTER.
STEP 6. DISCONNECT TWO OIL LINES FROM TRANSMISSION. REMOVE ADAPTERS AND PACKING FROM TRANSMISSION.
STEP 7. REMOVE FOUR SCREWS, LOCK WASHERS, AND FLAT WASHERS AND REMOVE TWO OIL LINES AND GASKETS FROM OIL COOLER.
STEP 8. DISCONNECT OIL LINE FROM OIL COOLER FROM TEE AND REMOVE TEE FROM TRANSMISSION.
STEP 9. DISCONNECT OIL LINE TO OIL COOLER FROM TRANSMISSION AND REMOVE ELBOW AND PACKING FROM TRANSMISSION.
STEP 10. DISCONNECT WIRES AND REMOVE TRANSMISSION OIL TEMPERATURE TRANSMITTER FROM TRANSMISSION.

MEC 3805-239-12/3-40

Figure 3-40. Transmission oil lines, removal and installation.



STEP 1. DISCONNECT INLET OIL LINE FROM FILTER. DISCONNECT OUTLET OIL LINE FROM BOTTOM OF FILTER.
STEP 2. REMOVE TWO SCREWS AND LOCK WASHERS SECURING BRACKET TO SIDE FRAME.
STEP 3. REMOVE TRANSMISSION OIL FILTER AND BRACKET FROM SIDE FRAME.
STEP 4. REMOVE TWO SCREWS, NUTS, AND WASHER SECURING FILTER MOUNTING BRACKET TO BRACKET. REMOVE FILTER FROM BRACKET.

MEC 3805-239-12/3-41

Figure 3-41. Transmission oil filter, removal and installation.

(3) Refer to figure 3–40 and remove transmission oil lines.

c. Installation.

(1) Refer to figure 3–40 and install transmission oil lines.

(2) Refer to paragraph 3–70 and fill the transmission.

3–72. Transmission Oil Filter

a. General. The transmission oil filter is mounted on the right side of the engine below the air compressor. The filter is connected to the transmission with two oil lines.

b. Service. Refer to paragraph 3–10 to service the transmission oil filter.

c. Removal.

(1) Refer to paragraph 3–71 and disconnect the transmission-to-filter oil lines from the transmission oil filter.

(2) Refer to figure 3–41 and remove the transmission oil filter.

d. Installation.

(1) Refer to figure 3–40 and install the transmission oil filter.

(2) Refer to paragraph 3–71 and connect transmission-to-filter oil lines to oil filter.

(3) Refer to paragraph 3–70 and recheck transmission fluid level.

Section XIV. DRIVE SHAFTS

3–73. General

a. Drive for the two axles is supplied through drive shafts leading from the transmission. The drive shaft to the rear axle differential is coupled directly to the transmission. A drive shaft extends from the parking brake to a bearing loaded support at the center of the loader. A front axle drive shaft extends from the support to the front axle.

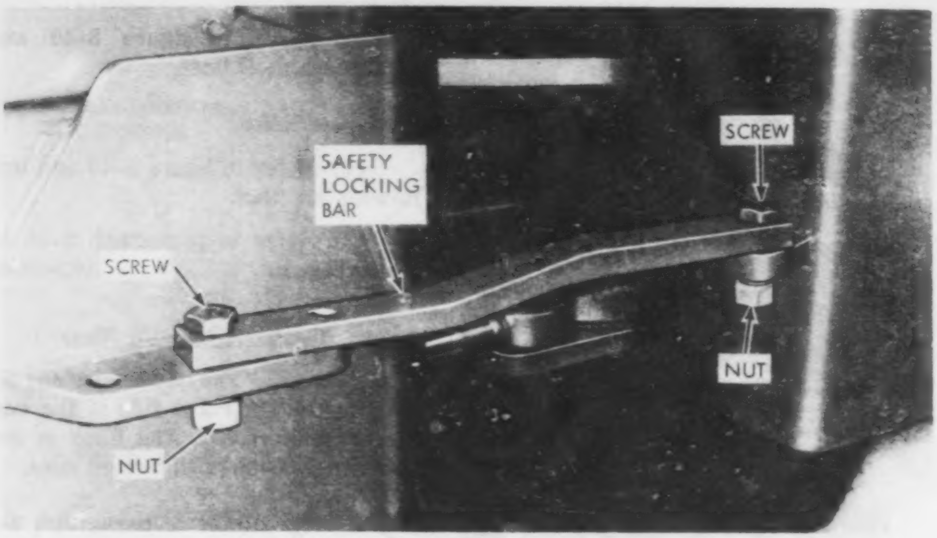
b. The drive shafts are connected with universal joints, allowing pivoting of the machine. The drive shaft between the transmission and the support has a sleeve enclosing a spring loaded ball type spline which allows the shaft to extend or telescope during turning action of the loader.

3–74. Drive Shafts

a. General.

(1) Block all wheels to prevent movement of the loader.

(2) Install safety locking bar (fig. 3–42)



STEP 1. INSTALL BAR ON LOCKING BRACKETS.
NOTE: LOADER CAN BE LOCKED IN THREE POSITIONS: PARTIAL RIGHT TURN, PARTIAL LEFT TURN, AND IN LINE. USE THREE HOLES IN REAR BRACKET TO LOCK LOADER IN POSITION REQUIRED.
STEP 2. SECURE LOCKING BAR WITH SCREWS AND NUTS.

MEC 3805-239-12/3-42

Figure 3-42. Safety locking bar, removal and installation.

in position illustrated to secure front and rear sections together and prevent any accidental articulation movement.

b. Removal.

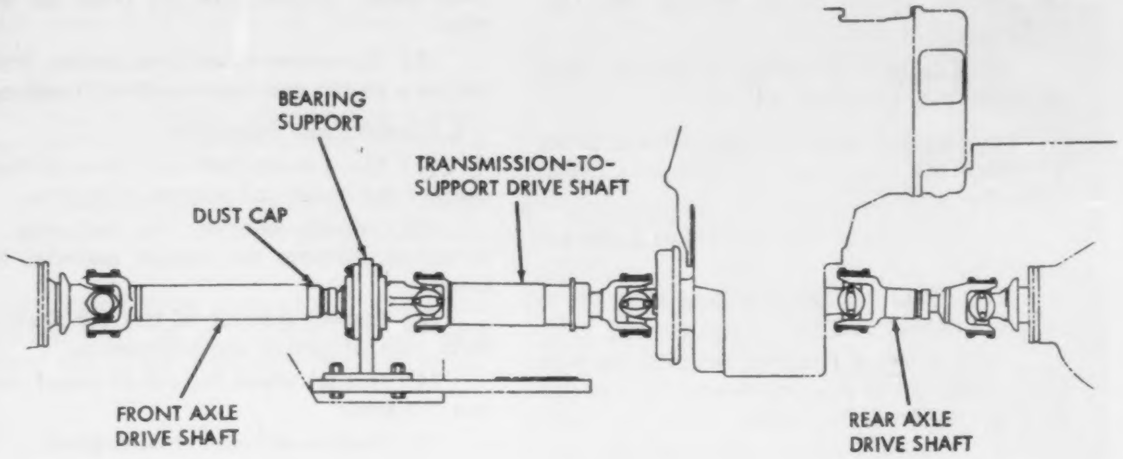
(1) Clean universal joints and spline areas before removal.

(2) Refer to figure 3-43 and remove the drive shafts.

c. Installation.

(1) Refer to figure 3-43 and install the drive shafts.

(2) Lubricate drive shafts in accordance with Lubrication Order (para 3-4).



STEP 1. DISCONNECT FRONT AXLE DRIVE SHAFT UNIVERSAL JOINT FROM FRONT AXLE DIFFERENTIAL.
STEP 2. UNSCREW DUST CAP AND SLIDE FRONT AXLE DRIVE SHAFT FROM SPLINES OF SUPPORT SHAFT.
STEP 3. DISCONNECT TRANSMISSION-TO-SUPPORT DRIVE SHAFT UNIVERSAL JOINTS AT EACH END OF SHAFT AND REMOVE SHAFT.
STEP 4. DISCONNECT REAR AXLE DRIVE SHAFT UNIVERSAL JOINTS AT EACH END OF DRIVE SHAFT AND REMOVE SHAFT.

NOTE: TO DISCONNECT UNIVERSAL JOINTS, REMOVE FOUR SCREWS, TWO LOCK PLATES, AND TWO COVER PLATES FROM THE YOKES ATTACHED TO THE AXLES, BEARING SUPPORT AND TRANSMISSION. WHEN INSTALLING SHAFTS, LUBRICATE SHAFT (PAR. 3-4).

MEC 3805-239-12/3-43

Figure 3-43. Drive shafts, removal and installation.

Section XV. TIRES, WHEELS, AND AXLES

3-75. General

a. The four wheels of the loader have tubeless rubber tires. The tires are mounted on the wheels with a flange and a lock ring.

b. Check tires frequently for cuts, bruises, broken cleats, and other damage. Check tires for cracks and deterioration which could result in future trouble. Maintain tire pressure at 45 psi.

c. The wheels are mounted to the outer rotating surface of the axle hub with twelve nuts. The torque of the wheel nuts should be checked frequently and torqued (para 1-14(15)) to the correct tightness if necessary.

d. The drive axles consist of a differential assembly in the center of the axle. The differential is driven by the drive shaft from the transmission and in turn drives the axle drive shafts connected to the planetaries in each wheel.

3-76. Wheels and Tires

a. Removal.

(1) Park the loader on a firm level surface with the bucket lowered and resting on

the ground. Install safety locking bar (fig. 3-42).

(2) Engage the parking brake and block all wheels not requiring removal.

(3) Using a suitable jack or hoist under the axle, raise the wheel at least two inches above the ground.

(4) If tire only is to be removed proceed as follows:

(*a*) Remove valve core and allow air to escape to deflate tire.

(*b*) Force a tire tool between the lock ring (2, fig. 3-44) and the flange (4) and pry the lock ring from the flange.

Warning: Stand to one side when prying lock ring from flange. Lock ring may fly out with enough force to injure personnel.

(*c*) Remove preformed packing (3) from wheel. Remove tire (5) from the wheel (7).

(5) To remove wheel from loader, remove twelve nuts (6) and remove wheel from loader.

b. Cleaning and Inspection.

(1) Use a damp cloth and clean all dirt or debris from inside and outside of the tire.

(2) Inspect exterior for bad cuts and abrasions. Remove all foreign material from tread.

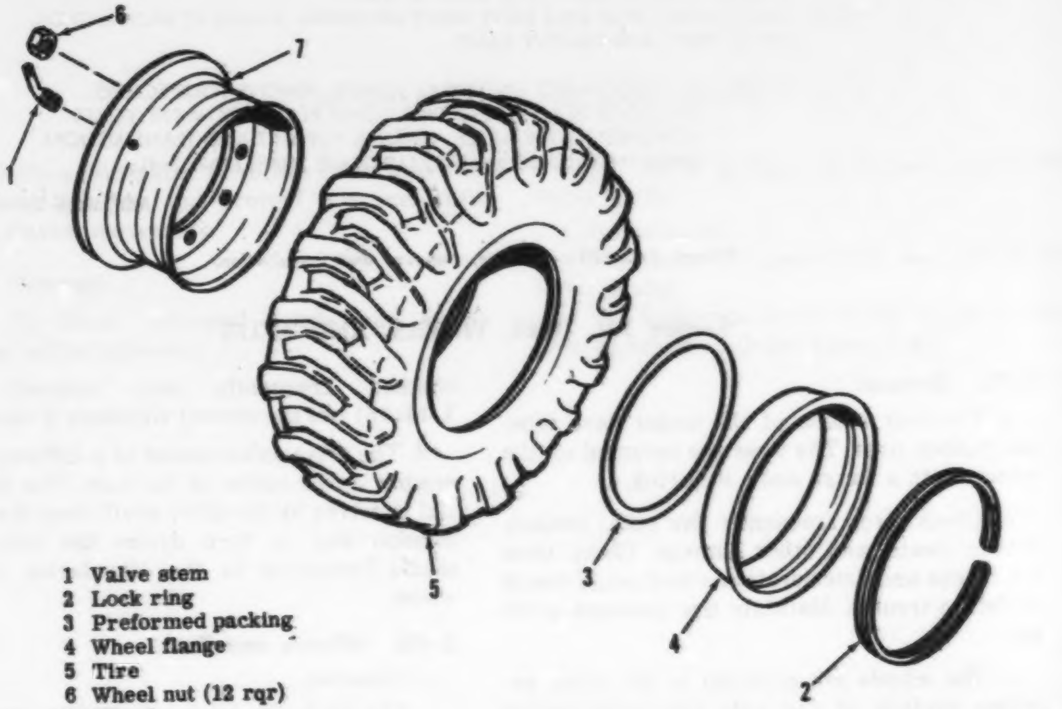
(3) Inspect interior of tire for sharp objects, cuts, abrasions and protrusions.

(4) Inspect wheel for out-of-round cracks and flat spots.

(5) Replace all unserviceable parts.

c. Installation.

(1) Install wheel (7, fig. 3-44) on axle and secure with twelve nuts (6). Torque



1 Valve stem
2 Lock ring
3 Preformed packing
4 Wheel flange
5 Tire
6 Wheel nut (12 rqr)
7 Wheel

MEC 3805-239-12/3-44

Figure 3-44. Tire and wheel, exploded view.

tighten nuts to a torque of 365-400 foot-pounds.

Note. Check torque of wheel nuts after 10, 50, and 100 hours of operation after installing a wheel. Always check torque of wheel nuts every 100 hours of operation.

(2) Install tire (5), packing (3), flange (4) and lock ring (2) in reverse of disassembly.

(3) Install valve stem (1) in wheel and inflate tire to 75 psi to properly seat tire bead on wheel and flange. Reduce pressure to 45 psi.

3-77. Axles

a. Inspection.

(1) Inspect differentials and planetaries for evidences of cracks, leaks, and damage.

(2) Check oil level in planetaries and differentials and replenish oil if necessary. Refer to current Lubrication Order for correct lubricant.

b. Service.

(1) Clean area around axle breather (fig. 3-45) and remove breather from axle.

(2) Clean breather in cleaning compound, solvent (Spec. P-S-661) and dry thoroughly with compressed air.

(3) Install axle breather in axle housing (fig. 3-45).

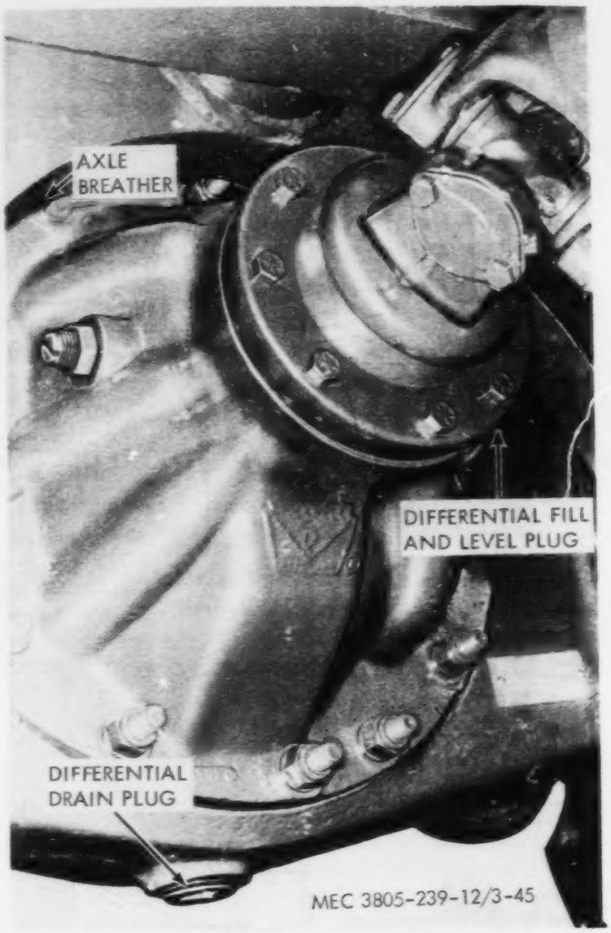


Figure 3-45. Axle breather, removal and installation.

Section XVI. AIR SYSTEM AND BRAKES

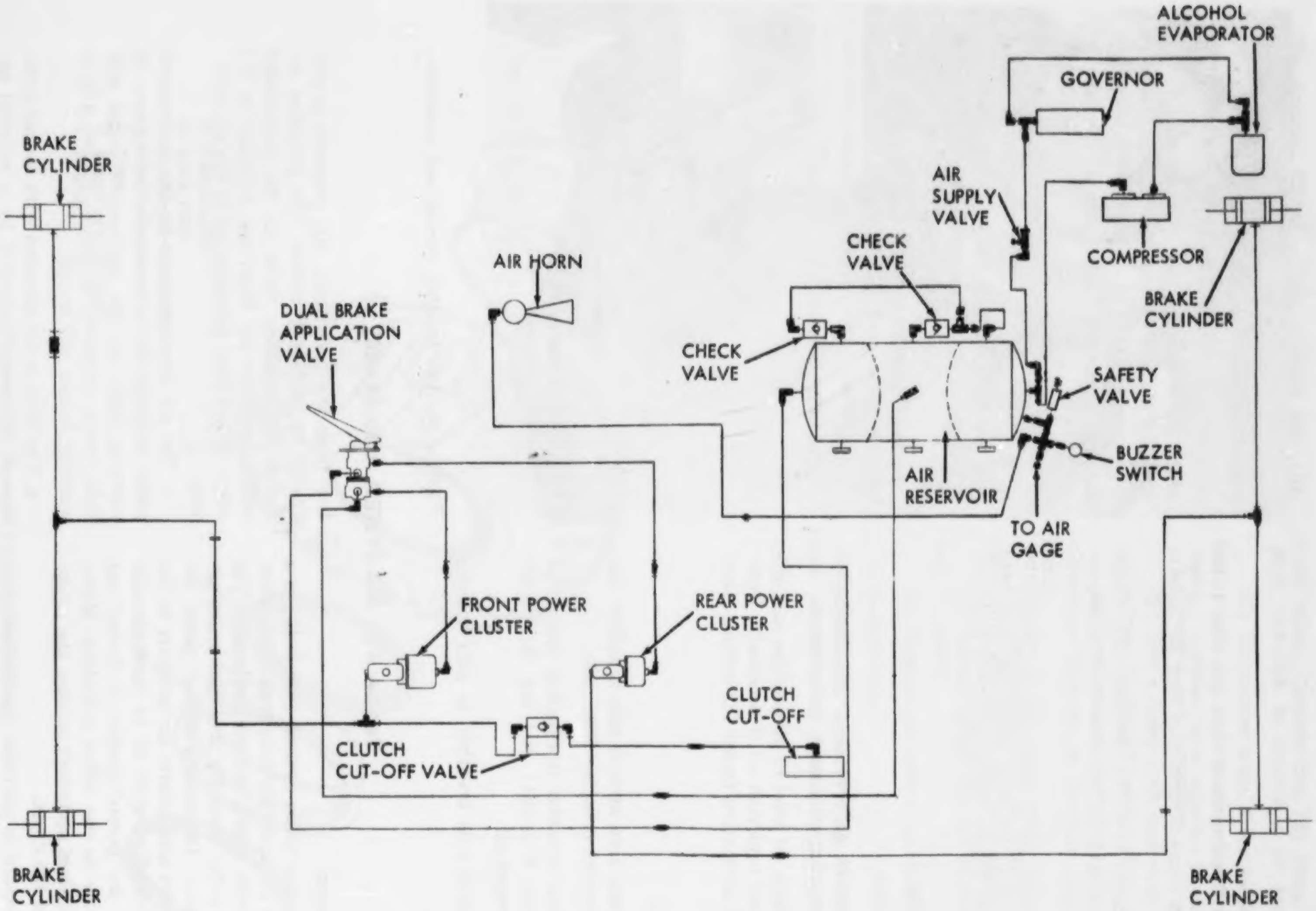
3-78. General

a. The service brake system (fig. 3-46) is a combination air and hydraulic type. Two interconnected brake pedals operate the brakes. The right brake pedal assembly is a dual brake application valve. Depressing either pedal actuates the valve and admits air pressure to the power clusters. Hydraulic oil in the hydraulic cylinder of the power cluster is forced out under pressure to the wheel cylinders. Movement of the wheel cylinders applies the brake shoes against the drum.

b. Air pressure is provided by the air compressor mounted on the engine and driven by a belt from the crankshaft. Air pressure is controlled by the air governor. The governor actuates the unloader valve in the compressor which bypasses air from one cylinder to the other rather than pumping air to the air reservoir.

c. The air pressure gage on the instrument panel indicates the pressure in the system. A warning light on the instrument panel will light when pressure is below 55 psi and a warning buzzer will sound.

d. The horn is air operated with the air pressure to the horn controlled by a solenoid actuated by the horn button.

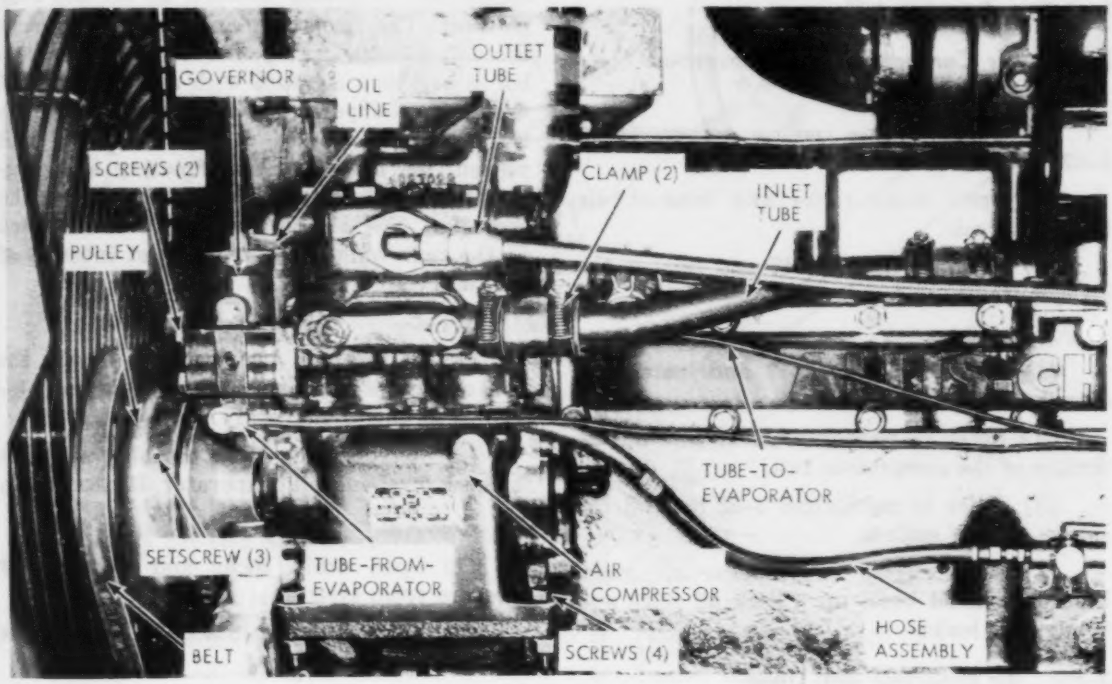


MEC 3805-239-12/3-46

Figure 3-46. Air system, schematic view.

e. Air from the compressor is pumped through an alcohol evaporator, governor, and supply valve to the air reservoir. The safety valve protects against excessive air pressure in the system. If air pressure rises above 150 psi the valve will exhaust air to keep pressure within limits. The reservoir has three compartments, a wet compartment where air from the compressor enters the tank, and two dry compartments which supply air to the two power clusters. Two check valves between the wet compartment and the two dry compartments which supply air to the two power clusters. Two check valves between the wet compartment and the two dry compartments prevent loss of air pressure should one or the other of the braking systems fail.

f. A clutch cut-off valve, located at the rear of the operator's compartment, controls the action of the transmission drive clutches when the brakes are applied. If the valve is in the operating position (control lever down) and depressing the brake pedal lightly, hydraulic pressure from the front power cluster is deliv-



STEP 1. DISCONNECT OUTLET TUBE.
STEP 2. LOOSEN TWO CLAMPS AND DISCONNECT INLET TUBE.
STEP 3. DISCONNECT TUBE-TO-EVAPORATOR FROM COMPRESSOR.
STEP 4. DISCONNECT TUBE-FROM-EVAPORATOR FROM GOVERNOR.
STEP 5. DISCONNECT HOSE ASSEMBLY FROM GOVERNOR.
STEP 6. REMOVE TWO SCREWS AND WASHERS AND REMOVE GOVERNOR AND GASKET.
STEP 7. DISCONNECT OIL LINE FROM COMPRESSOR.
STEP 8. REMOVE THREE SETSCREWS, UNSCREW PULLEY FROM SHAFT, AND REMOVE BELT AND TWO PULLEY HALVES.
STEP 9. REMOVE FOUR SCREWS, NUTS, AND LOCK WASHERS AND REMOVE AIR COMPRESSOR FROM BASE. REMOVE GASKET.

MEC 3805-239-12/3-47

Figure 3-47. Air compressor and governor, removal and installation.

ered to the transmission and disengages the drive clutches, halting power to the axles and diverting it to the hydraulic system. When operating on grades, this feature may be undesirable because the loader may move backward or forward momentarily before power can be restored to the transmission. Accordingly, the control is provided to disengage the automatic clutch release feature as desired. With the control in the "UP" position, the clutch cut-off is disengaged.

***Caution:* When changing the position of the cut-off valve control, the brake pedal should be fully released.**

3–79. Air Compressor and Governor

a. Removal.

(1) Drain engine cooling system (para 3–62).

(2) Open drain cocks and exhaust air from reservoir.

(3) Refer to figure 3–47 and remove the air compressor and governor.

b. Installation.

(1) Refer to figure 3–47 and install the compressor and governor.

(2) Refer to paragraph 3–12 and adjust tension of the compressor belt.

(3) Refer to paragraph 3–62 and fill the engine cooling system.

(4) Start engine and observe air gage. Pressure should build up. Check all lines and fittings for leaks.

3–80. Air Reservoir and Lines

a. General. The air reservoir is mounted on the right side of the loader frame. The reservoir is protected by a sheet metal cover with an access hole to reach the reservoir drain cock. Tubes and hoses carry air pressure to the reservoir from the air compressor and governor and from the reservoir to the dual brake application valve, horn, and air gage. A transmitter, mounted on the reservoir, actuates the warning buzzer and light when the pressure drops below 55 psi.

b. Removal.

(1) Open drain cocks and exhaust air from the reservoir and air system.

(2) Refer to figure 3–48 and remove the air reservoir and lines.

c. Installation.

(1) Refer to figure 3–48 and install air reservoir and lines.

(2) Start engine and observe air gage. Pressure should build up. Check all lines and fittings for leaks.

3–81. Alcohol Evaporator

a. General. To prevent moisture in the air system from freezing, some of the air from the compressor is passed through an alcohol evaporator. The moisture in the air moving through the evaporator absorbs sufficient alcohol to become a mixture with a freezing point well below temperatures that may be encountered in operation of the vehicle. This will prevent the moisture from freezing and clogging the lines and valves and preventing brake operation. The alcohol evaporator is mounted on the rear wall of the frame just inboard of the reservoir.

b. Service.

(1) In freezing temperatures, check the level of alcohol in evaporator every day and replenish alcohol if necessary.

(2) Remove plug from top of evaporator to check level and fill evaporator. Replace plug.

c. Removal.

(1) Open drain cocks and exhaust air pressure from system.

(2) Refer to figure 3–49 and remove the alcohol evaporator.

d. Installation.

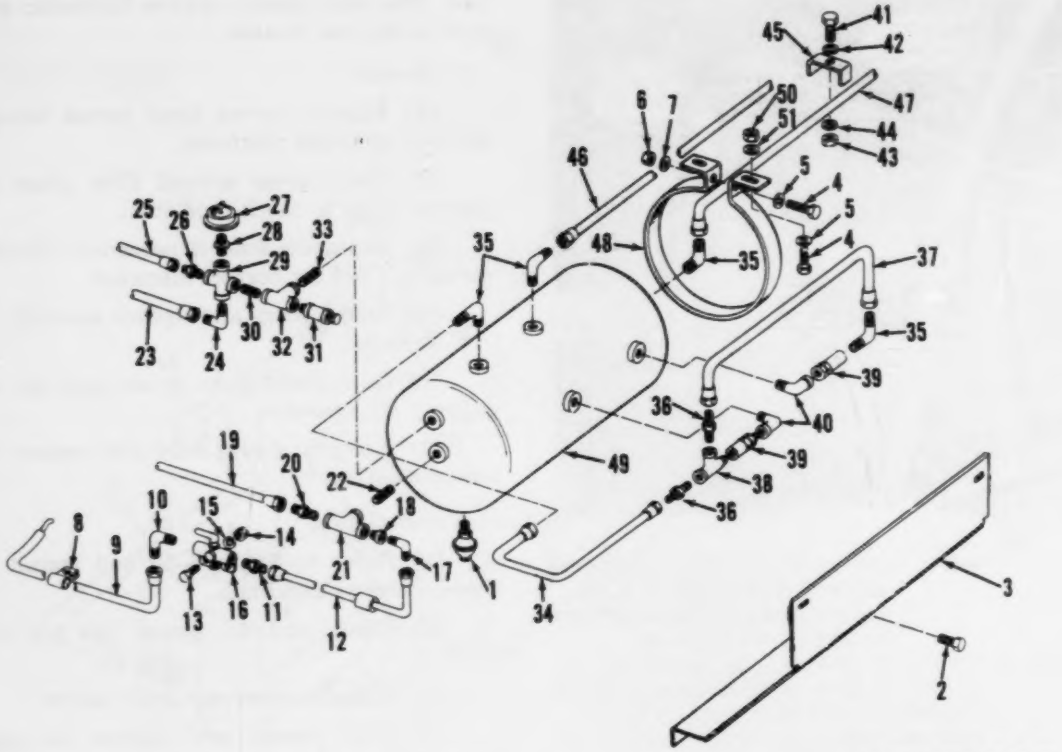
(1) Refer to figure 3–49 and install the alcohol injector.

(2) If freezing temperatures are anticipated, remove fill plug and fill evaporator with denatured alcohol (FSN 6810–209–0905).

(3) Start engine and observe air pressure gage. Pressure should build up. Check lines and fittings for leaks.

3–82. Brake Power Cluster

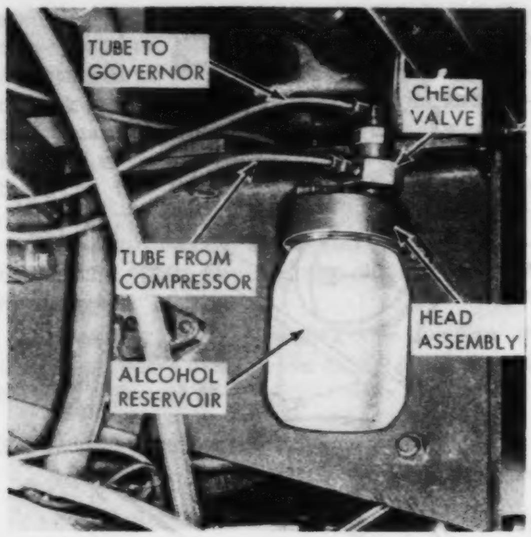
a. General. The two brake power clusters are mounted on the left side of the loader. Air lines from the brake valve connect to the air



MEC 3805-239-12/3-48

1 Drain cock (3)
2 Screw, cap, self-tapping; ⅜-16 x ¾ in. (4)
3 Shield
4 Screw, cap, hex-head ⅜-16 x 1 in. (4)
5 Washer, flat, ⅜ in. (4)
6 Nut, ⅜-16 (4)
7 Washer, lock, ⅜ in. (4)
8 Tube clamp
9 Hose, governor to supply valve
10 Elbow
11 Adapter
12 Hose, supply valve to reservoir
13 Screw, cap, hex-head, ⅜-16 x 1 in. (2)
14 Nut, ⅜-16 (2)
15 Washer, lock, ⅜ in. (2)
16 Air supply valve
17 Elbow
18 Reducing bushing
19 Hose, compressor to air reservoir
20 Adapter
21 Tee
22 Nipple
23 Tube, reservoir to horn
24 Elbow
25 Tube, reservoir to air gage
26 Adapter
27 Transmitter, air buzzer
28 Adapter
29 Pipe cross
30 Nipple
31 Safety valve
32 Tee
33 Nipple
34 Tube assembly
35 Elbow (4)
36 Adapter (2)
37 Tube assembly
38 Tee
39 Check valve (2)
40 Elbow (2)
41 Screw, cap, hex-head, ⅜-24 x 2 in. (2).
42 Washer, flat, ⅜ in. (2)
43 Nut, ⅜-24 (2)
44 Washer, lock, ⅜ in. (2)
45 Clamp (2)
46 Tube, reservoir to brake valve
47 Tube, reservoir to brake valve
48 Clamp bracket (2)
49 Reservoir

Figure 3-48. Air reservoir and lines, exploded view.



NOTE: BEFORE SERVICING OR REMOVING ALCOHOL EVAPORATOR, OPEN DRAIN COCKS ON AIR RESERVOIR TO RELEASE AIR PRESSURE.

STEP 1. TO SERVICE EVAPORATOR, UNSCREW RESERVOIR FROM HEAD ASSEMBLY. CLEAN RESERVOIR AND REFILL WITH ALCOHOL (FSN 6810-209-0905). INSTALL RESERVOIR.

STEP 2. TO REMOVE RESERVOIR, DISCONNECT TUBES AND REMOVE FITTINGS AND CHECK VALVE FROM HEAD ASSEMBLY.

STEP 3. REMOVE THREE SCREWS AND NUTS AND REMOVE ALCOHOL EVAPORATOR.

MEC 3805-239-12/3-49

Figure 3-49. Alcohol evaporator, removal and installation.

chamber at the rear of the loader. The front cluster controls the brake action of the front wheels and the clutch cut-off at the transmission. The rear cluster applies hydraulic pressure to the rear brakes.

b. *Service.*

(1) Remove covers from access holes in left side of loader platform.

(2) Clean areas around filler plugs and remove plugs to check fluid level.

(3) Replenish fluid if necessary. Refer to paragraph 3-4 for correct lubricant.

(4) Install plugs and tighten securely.

c. *Removal.*

(1) Open drain cocks on air reservoir and exhaust air pressure.

(2) Refer to figure 3-50 and remove the power clusters.

d. *Installation.*

(1) Refer to figure 3-50 and install the power clusters and lines.

(2) Check and fill power clusters with fluid.

(3) Close air reservoir drain valves.

(4) Start engine and observe air gage. Pressure should build up. Check air lines for leaks.

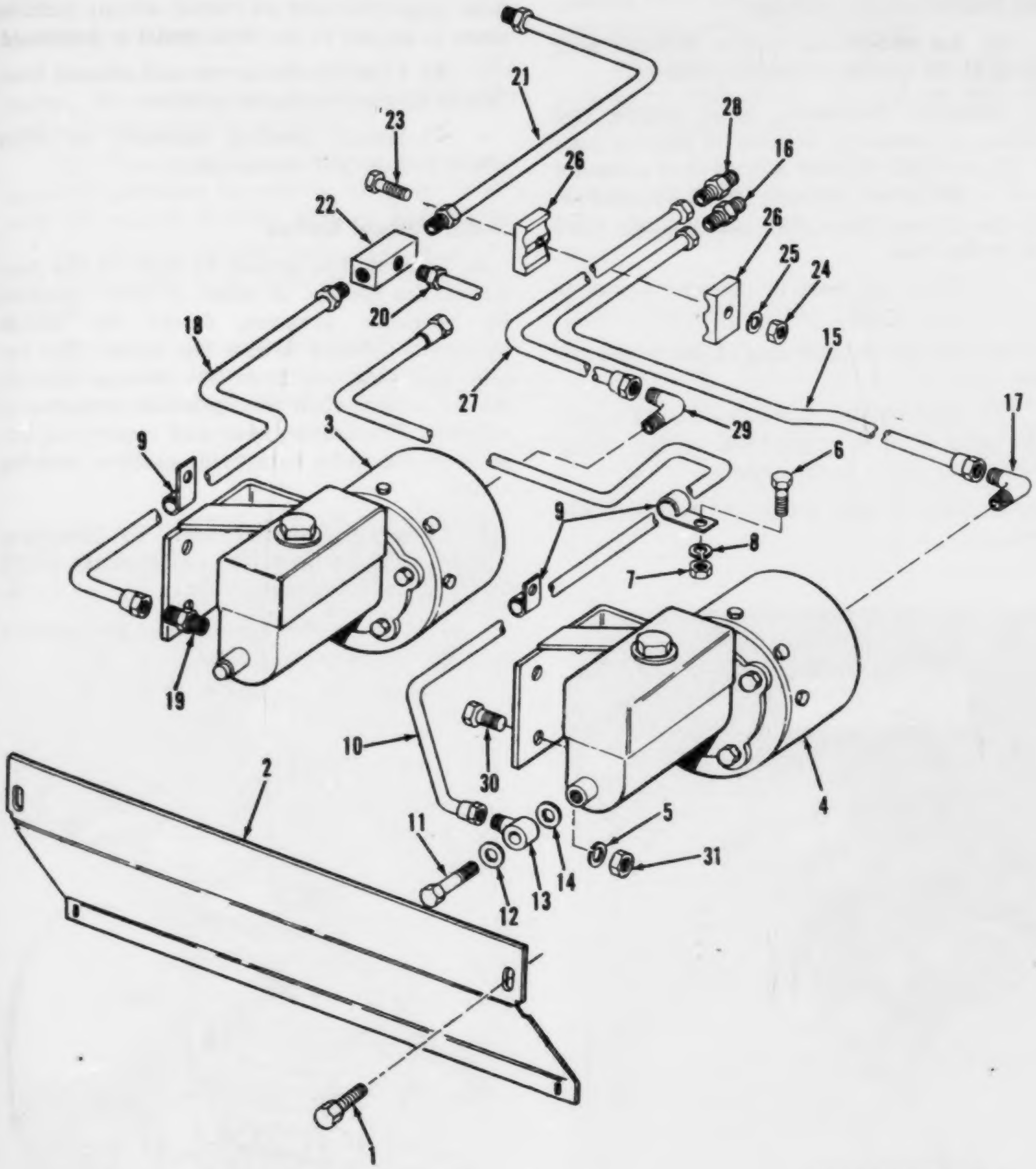
e. *Bleeding Brake Hydraulic System.* To function properly the brake hydraulic system must be free of air. The brake hydraulic system must be bled when any of the following happen.

(1) The brake system is drained, flushed, and filled with new fluid.

(2) Any portion of the system has been disconnected or replaced.

Figure 3-50—Continued.

1	Screw, cap, hex-head, ⅝-16 x ⅞ in. (6)
2	Cover plate
3	Front power cluster
4	Rear power cluster
5	Washer, lock, ⅜ in. (8)
6	Screw, cap, hex-head, ⅜-24 x 1¼ in.
7	Nut, ⅜-24
8	Washer, lock, ⅜ in.
9	Clamp (3)
10	Tube, cylinder to rear brakes
11	Adapter
12	Washer
13	Adapter
14	Washer
15	Tube, brake valve to cluster
16	Tube union
17	Elbow
18	Tube, cylinder to tee
19	Adapter
20	Tube, tee to cut-off valve
21	Tube, tee to front brakes
22	Tee
23	Screw, cap, hex-head, ⅝-16 x 1½ in. (2)
24	Nut, ⅝-16 (2)
25	Washer, lock, ⅝ in. (2)
26	Clamp half (4)
27	Tube, brake valve to cluster
28	Tube union
29	Elbow
30	Screw, cap, hex-head, ⅝-16 x 1 in. (8)
31	Nut, ⅝-16 (8)



MEC 3805-239-12/3-50

Figure 3-50. Brake power cluster, removal and installation.

(3) Air enters the system due to insufficient fluid in master cylinder.

(4) Air enters the system through poor sealing at the master or brake cylinders.

f. Bleeding Procedure. Start engine and build up air pressure. Remove fill plug on master cylinder and connect a hose to the bleeder screw on the wheel cylinder (fig. 3–51) and insert end of hose into a glass jar partially filled with brake fluid.

(1) Place one man in operator's seat to depress brake pedal.

(2) Station another man at the wheel cylinder.

(3) Open bleeder screw one turn. Depress brake pedal to force piston through full stroke to remove air from brake system.

(4) Close bleeder screw and release brake pedal.

(5) Fill master cylinder with fluid and repeat steps (3) and (4) until all air bubbles cease to appear in jar when pedal is depressed.

(6) Close bleeder screw and remove hose. Install fill plug in master cylinder.

(7) Repeat bleeding operation on other wheel cylinders if necessary.

3–83. Wheel Brakes

a. General. The brakes in each of the four wheels are similar. A wheel cylinder operated by hydraulic pressure, forces the linings against the drums to stop the loader. The linings are removed from the drums through spring action when the hydraulic pressure is released. The linings wear and require adjustment of the cams to provide positive braking action.

b. Checking Piston Travel. To determine whether brakes require adjustment, check travel of piston in power cluster.

(1) With engine running and air pressure built up, depress brake pedal.

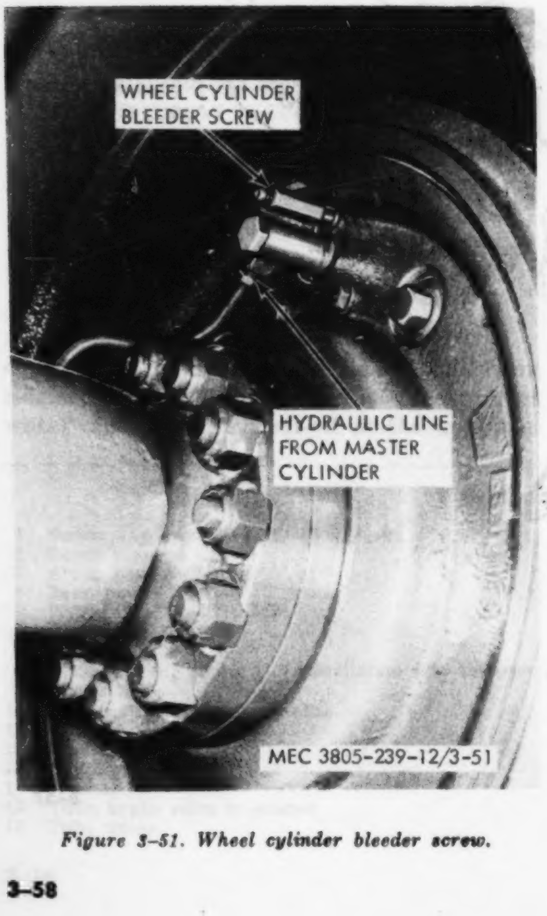


Figure 3–51. Wheel cylinder bleeder screw.

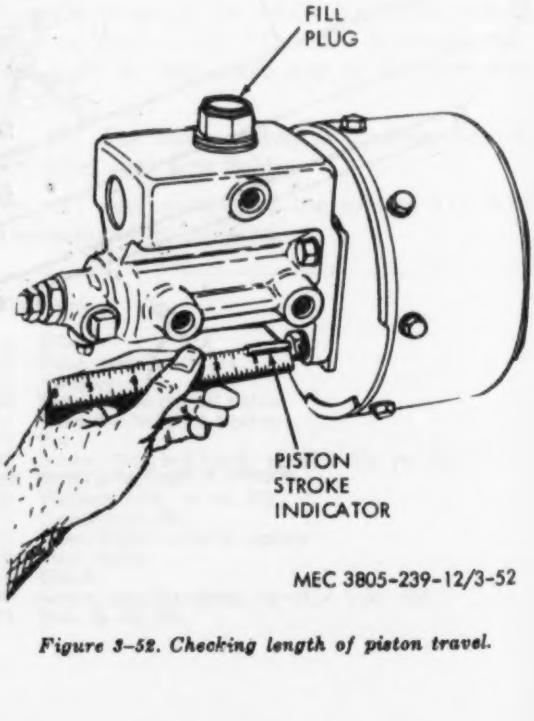


Figure 3–52. Checking length of piston travel.

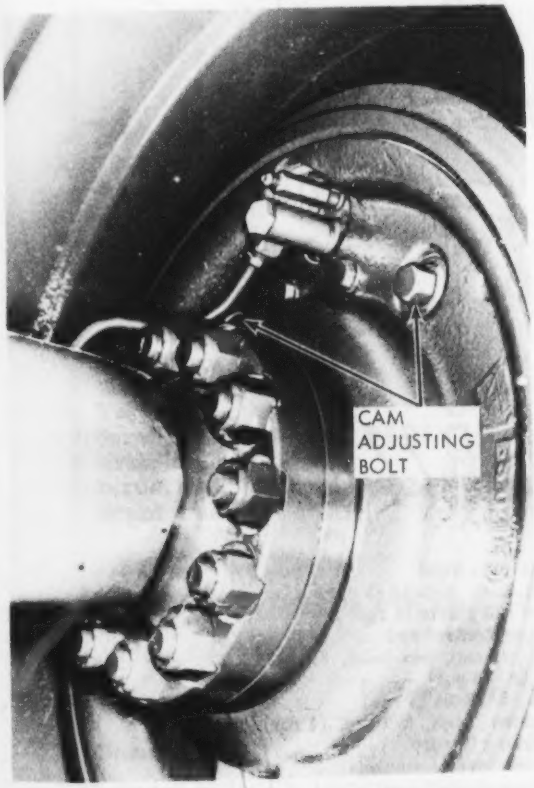
(2) Check piston travel at indicator as illustrated on figure 3–52.

(3) Maximum piston travel is 1.500 inches. When indicator travel reaches 1.250 inches brakes must be adjusted.

(4) Disengage the parking brake and place transmission in neutral. Block all wheels with the exception of the wheel to be adjusted.

(5) Place a suitable jack under the frame and raise loader until both wheels are off the ground.

(6) Turn cam adjusting bolts (fig. 3–53) to move brake linings against drum. Rotate wheel around linings. Alternately turn cam adjusting bolts until brake linings lock the drum and prevent wheel from turning.



NOTE: ROTATE CAM ADJUSTING BOLTS OUTWARD AND DOWNWARD TO MOVE SHOE AGAINST DRUM.

MEC 3805-239-12/3-53

Figure 3–53. Adjusting wheel brakes.

(7) Back off cam adjusting bolt only enough to free linings from drum and allow wheel to rotate freely.

(8) Lower jack to place wheel on ground and repeat procedure on other wheels.

Note. Adjustment procedure is the same for all wheels.

3–84. Parking Brake

a. General. The parking brake is mounted on the front of the transmission. The brake is mechanical with internal expanding shoes. A lever in the operator's compartment controls the brake action. When the lever is pulled up the linkage engages the linings with the drum. The drum is connected to the front drive shaft. Purpose of the brake is to hold the loader motionless when parked or making repairs or adjustments.

b. Removal. Park the loader on firm level ground. Block the wheels to prevent loader from moving.

(1) Refer to figure 3–54 and remove the parking brake linkage.

(2) Disconnect front drive shaft (fig. 3–43) from yoke (3, fig. 3–55).

(3) Refer to figure 3–55 and remove the parking brake.

c. Installation.

(1) Refer to figure 3–55 and install the parking brake on the transmission.

(2) Tighten screws (6) to a torque of 81 to 97 foot-pounds.

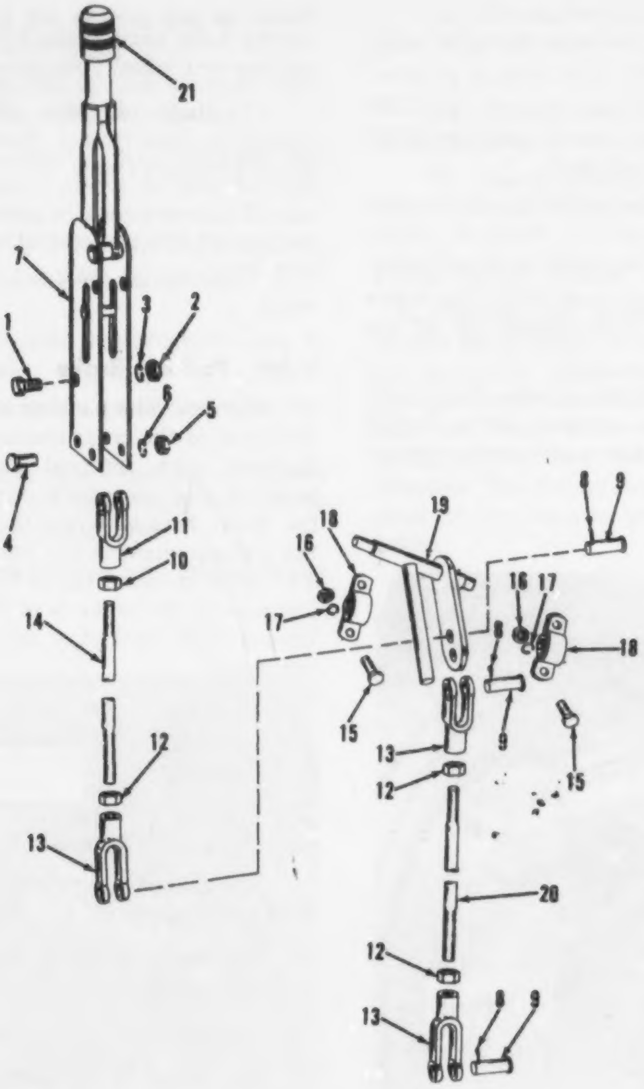
(3) Tighten screws (4) to a torque of 41 to 49 foot-pounds.

(4) Tighten nut (1) to a torque of 600 to 800 foot-pounds.

(5) Refer to figure 3–54 and install the parking brake linkage.

(6) Connect front drive shaft (fig. 3–43) to yoke.

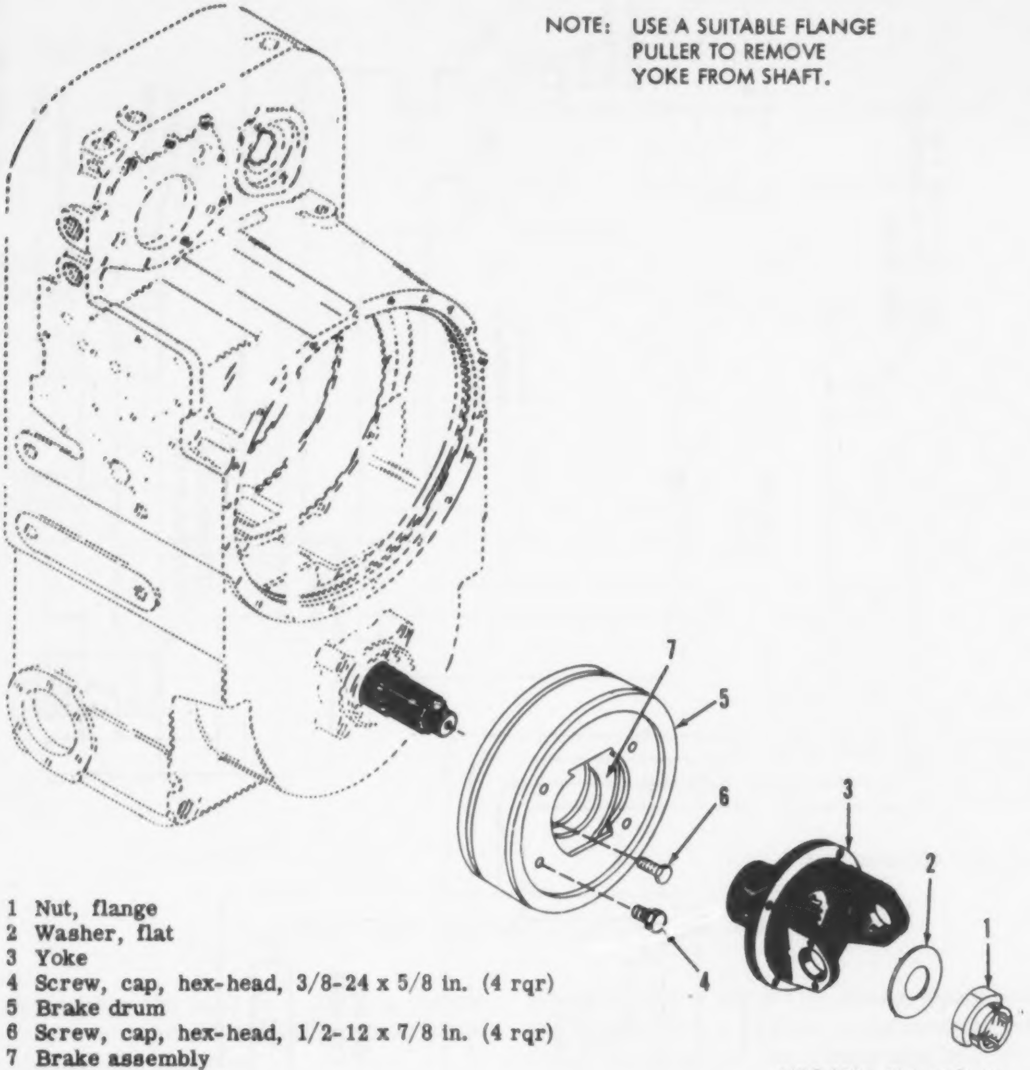
d. Adjustment. Refer to paragraph 3–12.



1 Screw, cap, hex-head, 5/16-24 x 1-3/4
2 Nut, 5/16-24
3 Washer, lock, 5/16 in.
4 Screw, cap, hex-head, 3/8-24 x 1-3/4
5 Nut, 3/8-24
6 Washer, lock, 3/8 in.
7 Lever assembly
8 Pin, cotter, 1/8 x 1 in. (3 rqr)
9 Clevis pin (3 rqr)
10 Nut, jam, 5/16-24
11 Rod end clevis
12 Nut, jam, 1/2-12 (3 rqr)
13 Rod end clevis (3 rqr)
14 Upper control rod
15 Screw, cap, hex-head, 5/16-24 x 1 in. (4 rqr)
16 Nut, 5/16-24 (4 rqr)
17 Washer, lock, 5/16 in. (4 rqr)
18 Bearing (2 rqr)
19 Cross lever
20 Lower control rod
21 Knob

MEC 3805-239-12/3-54

Figure 3-54. Parking brake linkage, exploded view.



NOTE: USE A SUITABLE FLANGE PULLER TO REMOVE YOKE FROM SHAFT.

1 Nut, flange
2 Washer, flat
3 Yoke
4 Screw, cap, hex-head, 3/8-24 x 5/8 in. (4 rqr)
5 Brake drum
6 Screw, cap, hex-head, 1/2-12 x 7/8 in. (4 rqr)
7 Brake assembly

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Figure 3-55. Parking brake, removal and installation.

Section XVII. HYDRAULIC SYSTEM

3-85. General

a. The loader hydraulic system, exclusive of the wheel brakes operates the loader boom, bucket, clam, and steering. The hydraulic system is illustrated on figures 3-56 and 3-57.

b. A hydraulic reservoir (fig. 3-56), mounted directly behind the operator's compartment, stores the oil for the system.

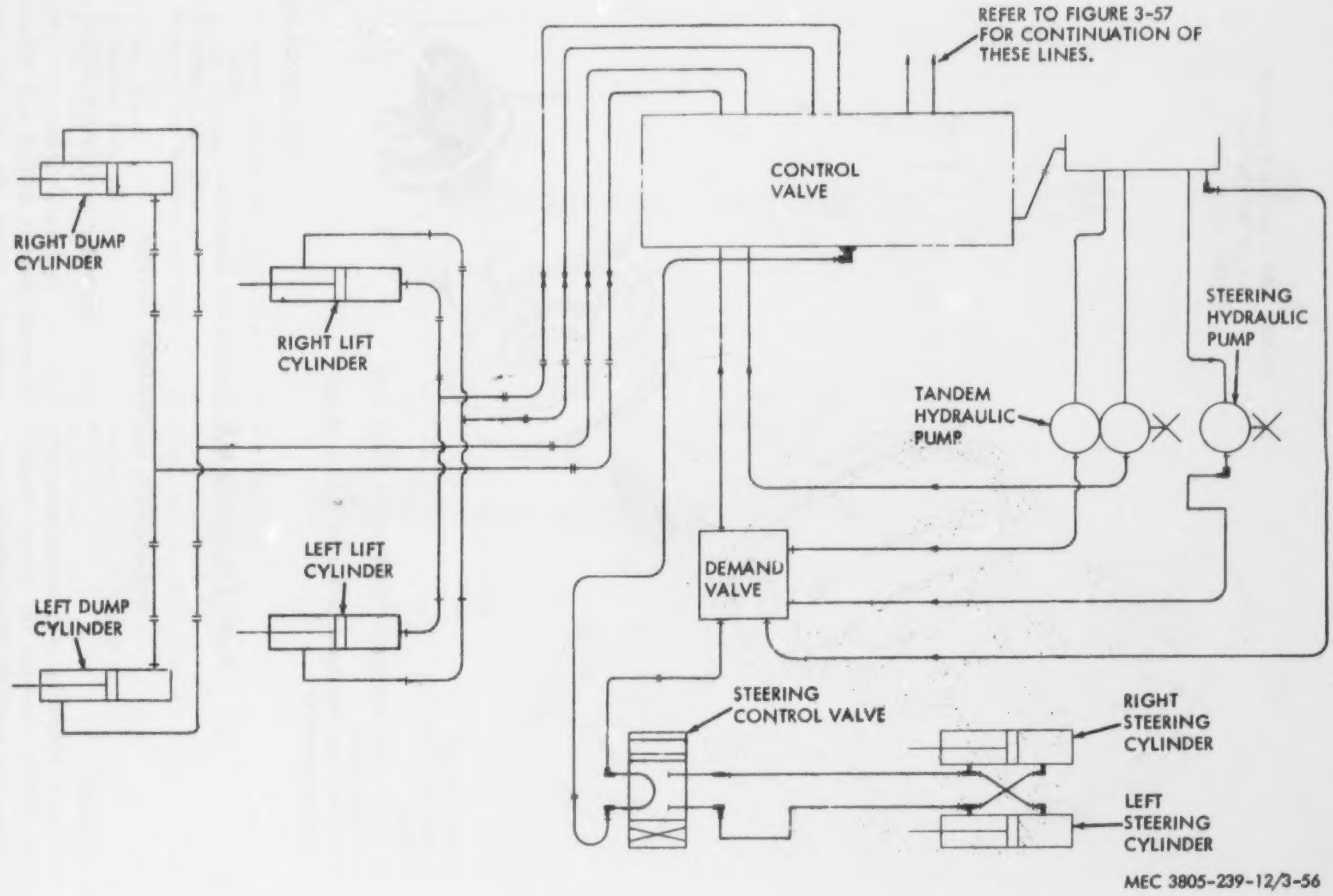


Figure 3–56. Loader hydraulic system, schematic view.

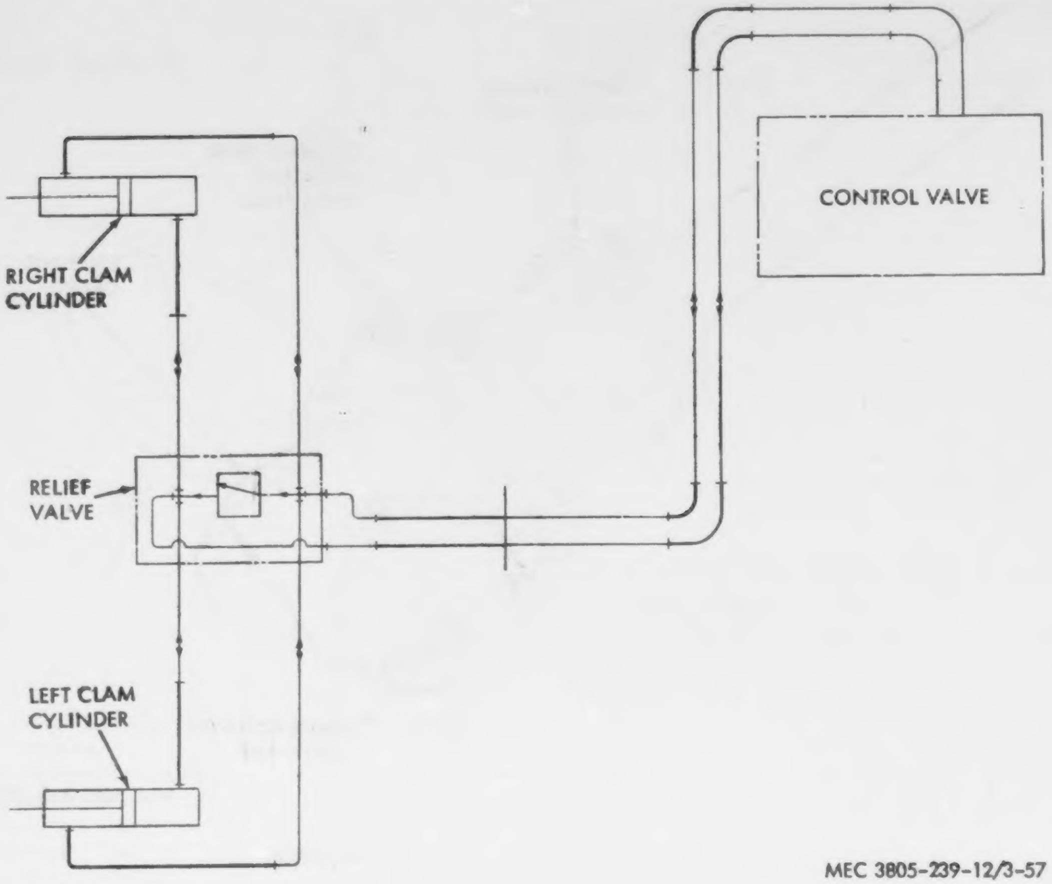


Figure 3-57. Bucket hydraulic system, schematic view.

Mounted within the tank is a filter, a bypass valve, and a strainer along with a magnet for trapping metallic particles.

c. The oil flows from the reservoir to the tandem hydraulic pump and the steering hydraulic pump. Oil flow is pumped to the control valve and to the demand valve from the tandem pump.

d. Two levers (fig. 2–3) control operation of the valve and distribute the oil to the dump, lift, and clam cylinders (fig. 3–57). The oil flow operates the cylinders, raising and lowering the boom, opening or closing the bucket, and operating the bucket clam.

e. The steering wheel (fig. 2–3) operates the steering control valve (fig. 3–56). Operation of the valve delivers oil flow to the steering cylinders. Movement of the piston and rod within the steering cylinders causes the loader's articulation by a push and pull feature turning the loader. Hydraulic flow for the power steering is supplied by the power steering hydraulic pump. If the steering pump is not supplying sufficient flow to operate the steering system, the demand valve will divert oil from the tandem hydraulic pump to the steering valve to supply flow to operate steering system.

3–86. Steering Gear

a. General. The steering gear consists of the

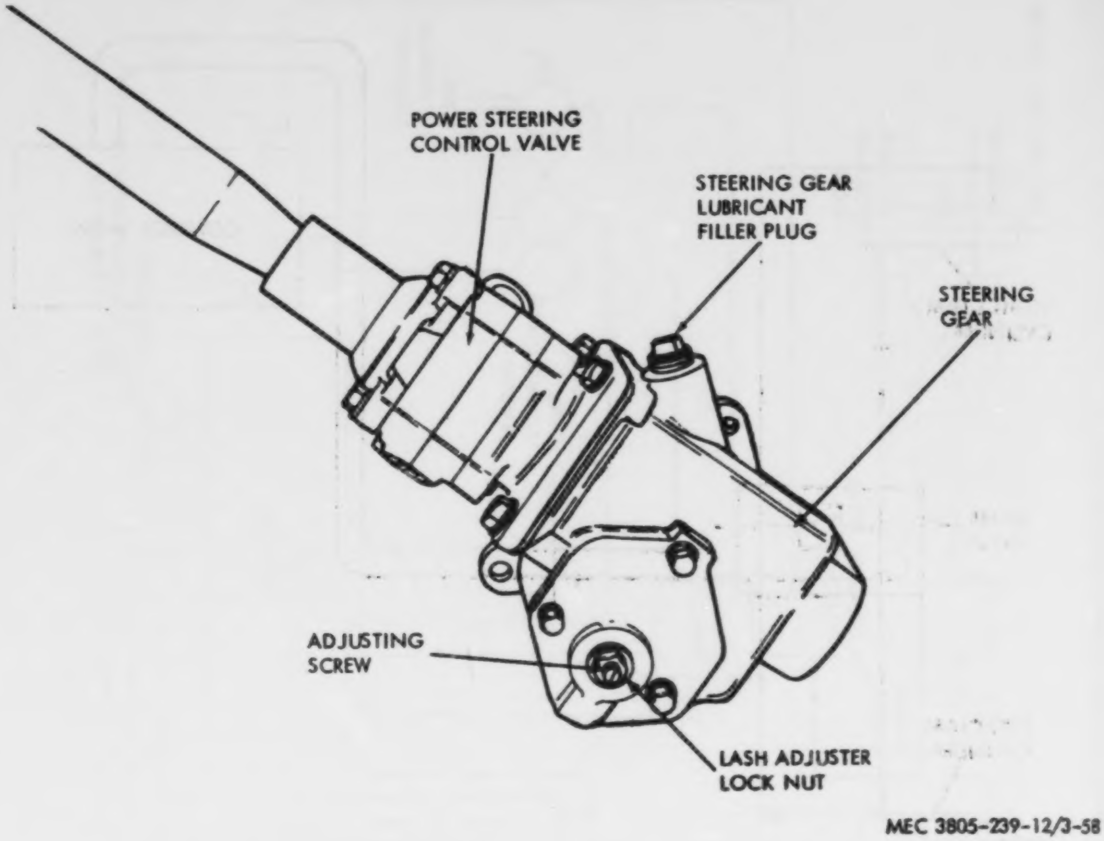


Figure 3-58. Steering gear service and adjustment.

steering control valve and a steering gear assembly which actuates the steering arm.

b. Service. The steering gear lubricant should be checked every 500 hours and replenished as necessary.

(1) Refer to figure 3-58 and remove the filler plug. Check level of lubricant. Add lubricant if necessary.

(2) Refer to paragraph 3-4 for correct grade of lubricant.

(3) Install filler plug.

c. Adjustment. If an excessive amount of play becomes noticeable in the steering system the steering gear lash should be adjusted.

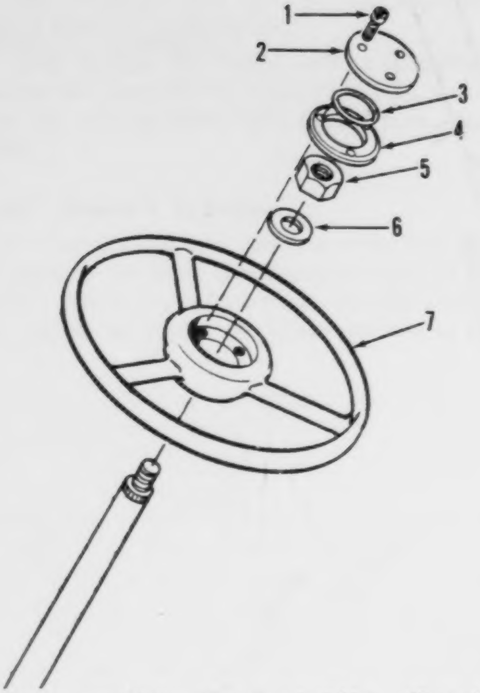
(1) Refer to figure 3-60 and disconnect the steering arm from the steering gear.

(2) Turn steering wheel from one extreme to the other and return steering wheel to the center position.

(3) Attach a spring scale to one spoke of the steering wheel at a nine inch radius to measure pull through center position.

(4) Loosen lash adjuster lock nut (fig. 3-58) and turn adjusting screw (fig. 3-58) clockwise until backlash disappears between teeth on ball nut and teeth on sector shaft and gear.

(5) Correct adjustment requires a pull of 1⅛ to 2 pounds to move the steering wheel through a 3 inch arc.



1. Screw, machine, No. 8 x 1-1/4 in. (3 rqr)
2. Medallion
3. Preformed packing
4. Spacer
5. Nut, 1/2-13
6. Washer, flat, 1/2 in.
7. Steering wheel

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Figure 3-59. Steering wheel, removal and installation.

(6) Tighten lock nut (fig. 3-58) to a torque of 25 to 35 pound feet.

3-87. Steering Wheel

a. General. The steering wheel is connected to the steering shaft. The shaft is enclosed in a hollow column and extends down to the steering valve. Rotation of the wheel actuates the valve and delivers the hydraulic oil to the steering cylinders.

b. Removal.

(1) Remove the three screws (1, fig. 3-59) and remove medallion (2), preformed packing (3), and spacer (4).

(2) Remove nut (5) and washer (6) from steering shaft.

(3) Using a suitable puller, remove steering wheel (7) from the shaft.

c. Installation. Refer to figure 3-59 and install the steering wheel.

3-88. Steering Arm and Tie Rod

a. General. The steering arm is actuated by the lower part of the steering gear. The arm is connected to the tie rod.

b. Removal. Refer to figure 3-60 and remove the steering arm and tie rod.

c. Installation. Refer to figure 3-60 and install the steering arm and tie rod.

d. Adjustment.

(1) Turn steering wheel from a full left to a full right (stop to stop) and count the number of turns.

(2) Center the steering wheel, by taking exactly half the total number of turns.

(3) The loader must be in a straight ahead position, measure both sides for equal distance from the center of the front planetary axle to the center of the rear planetary axle.

(4) Install steering arm on the steering arm gear so that the arm is hanging down and is *approximately one spline forward of the vertical position.*

(5) Secure the steering arm with lockwasher and nut. Do not tighten nut to a full torque, make snug.

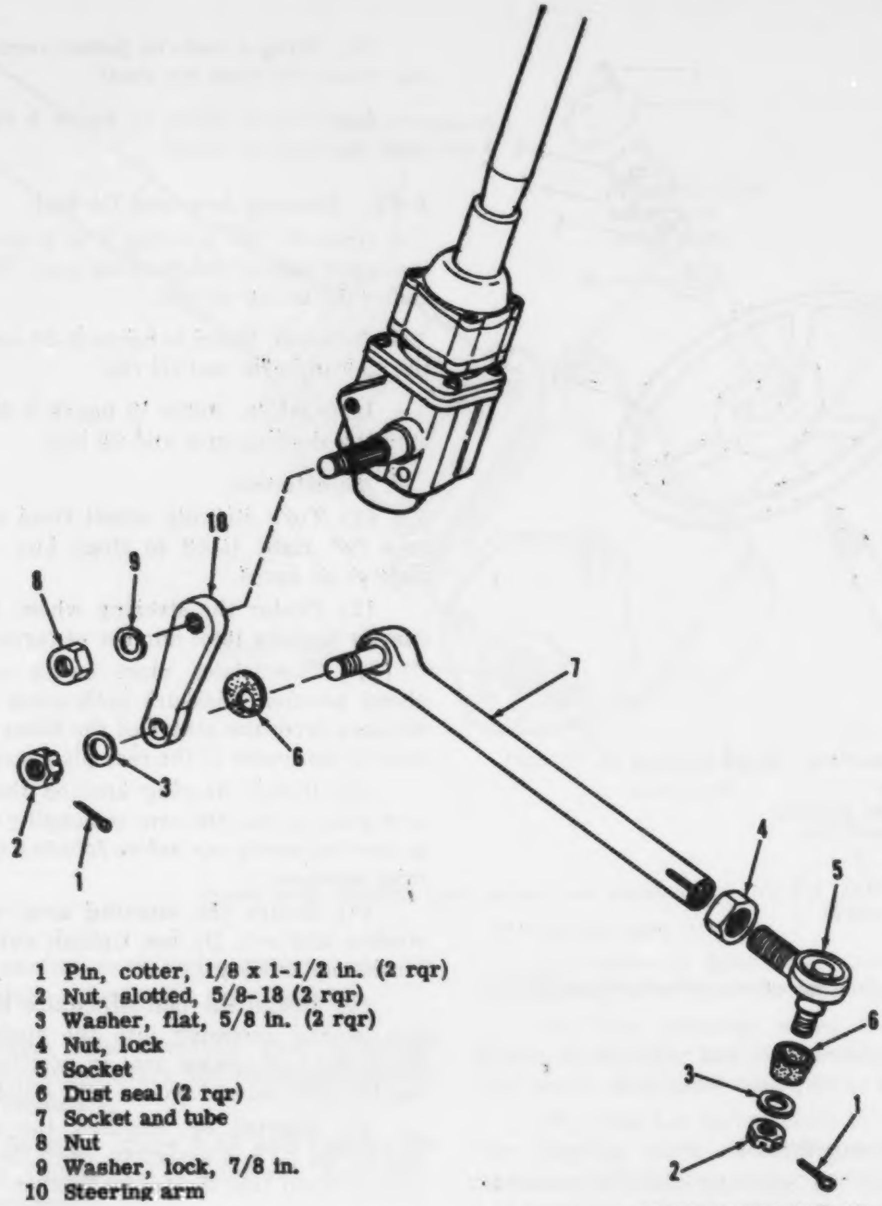
(6) Install the non-adjustable ball end of the tie rod assembly into the steering arm. Place the dust socket seal in position protecting the ball end and secure with a slotted nut.

(7) Shorten or lengthen the adjustable end of the tie rod assembly, until the ball stud centers itself into the frame bracket.

(8) Place the dust socket seal in position and secure with a slotted nut.

(9) Start engine and slowly turn the loader to the right, be sure that the steering arm clears the front frame. (Steering arm moves to the rear during a right turn). Also, check for left turn interference.

(10) Should there be interference with the top of the front frame, remove nut from steering arm and move steering arm one spline or notch to the rear or front of the loader and



1 Pin, cotter, 1/8 x 1-1/2 in. (2 rqr)
2 Nut, slotted, 5/8-18 (2 rqr)
3 Washer, flat, 5/8 in. (2 rqr)
4 Nut, lock
5 Socket
6 Dust seal (2 rqr)
7 Socket and tube
8 Nut
9 Washer, lock, 7/8 in.
10 Steering arm

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Figure 3-60. Steering arm and tie rod, exploded view.

reinstall. Re-adjust the adjustable end of the tie rod assembly to compensate for the increase or decrease in length.

(11) If no interference is noted, turn loader to full left or right to be sure of getting a full stop to stop turn.

(12) Tighten steering arm nut to 100–125 lbs. ft.

(13) Tighten jam nut on the adjustable end of the tie rod assembly.

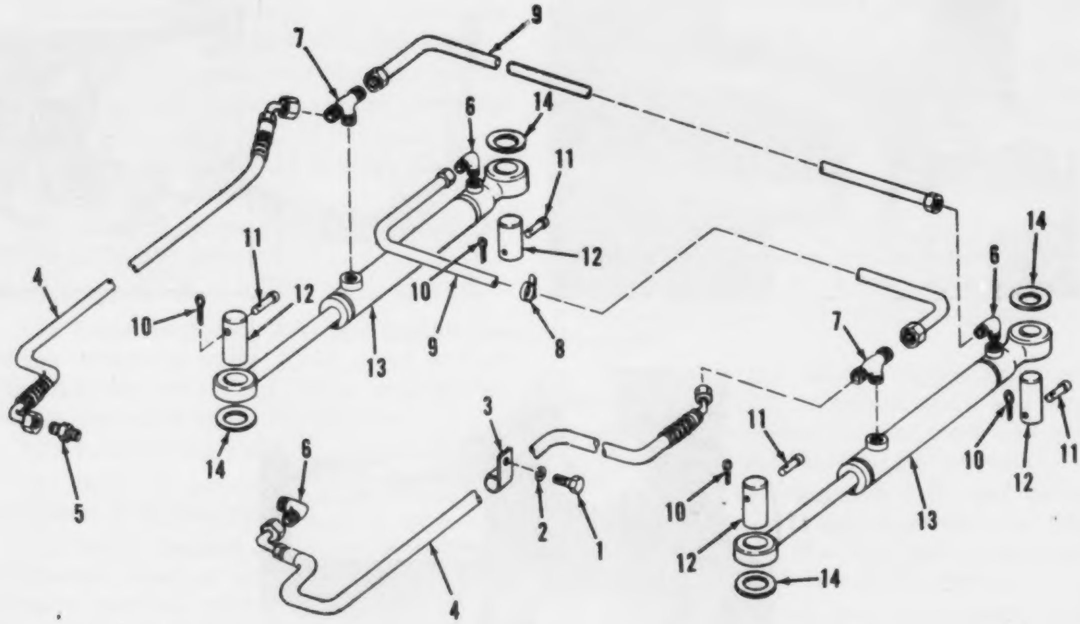
(14) Torque the slotted nuts on each end of the tie rod assembly to 140–150 lbs, ft. and secure the slotted nuts with cotter pins where used.

3–89. Steering Cylinders

a. General. The two steering cylinders work in tandem to turn the front section of the loader. When one cylinder rod extends to push the side of the loader the other retracts to pull the opposite side to the rear. This movement pivots the entire front section, including the wheels and turns the loader. The power steering makes it possible for the operator to turn the front section even while standing without undue effort.

b. Removal.

(1) Refer to figure 3–61 and remove the two cotter pins (10), locking pins (11) and pivot pins (12) from the front mounting brackets. Retract piston rod into cylinder assembly.



1 Screw, cap, hex-head, 3/8-16 x 1 in. (3 rqr)
2 Washer, lock 3/8 in. (3 rqr)
3 Clamp (3 rqr)
4 Hose, valve to cylinder (2 rqr)
5 Adapter
6 Elbow (3 rqr)
7 Tee (2 rqr)
8 Nylon tie
9 Hose, cylinder to cylinder (2 rqr)
10 Pin, cotter, 1/8 x 1 in (4 rqr)
11 Pin, locking (4 rqr)
12 Pin, pivot (4 rqr)
13 Steering cylinder (2 rqr)
14 Spacer (4 rqr)

MEC 3805-239-12/3-61

Figure 3–61. Steering cylinders and hoses, exploded view.

(2) Disconnect two hoses (4) from tees (7), adapters (5) and elbow (6). Remove fittings.

Note. Cap or plug all hoses and cylinder and valve openings to prevent entrance of any foreign material.

(3) Remove cotter pins, locking pins, and connecting pins from rear ends of cylinders. Rest cylinders on transmission mounting brackets before removing pivot pins.

(4) Slide cylinders frontward and out from beneath vehicle. Place cylinder in a clean area.

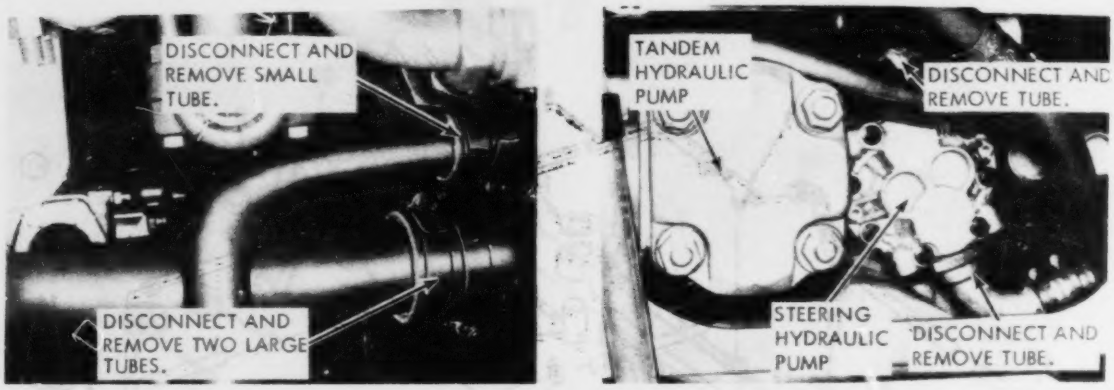
c. Installation.

(1) Refer to *b* above and figure 3-61 and reverse the procedure to install the steering cylinders.

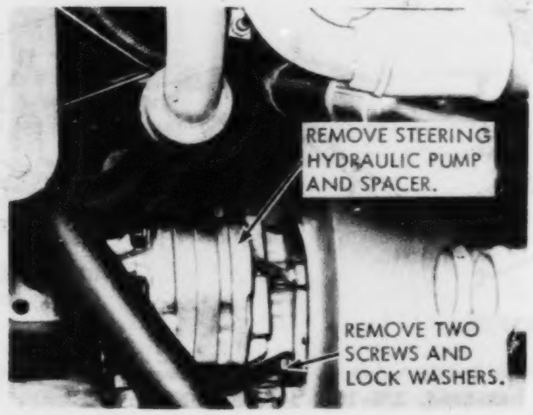
(2) Install cylinders with outlet ports facing toward center of unit.

3-90. Steering Hydraulic Pump

a. General. The steering hydraulic pump (fig. 3-56) is driven by the transmission power takeoff. The pump draws oil from the tank and delivers it to the demand valve (fig. 3-56). From the valve the oil is sent to the steering


DISCONNECT AND REMOVE SMALL TUBE.
DISCONNECT AND REMOVE TWO LARGE TUBES.
TANDEM HYDRAULIC PUMP
DISCONNECT AND REMOVE TUBE.
STEERING HYDRAULIC PUMP
DISCONNECT AND REMOVE TUBE.

STEP 1. DISCONNECT TUBES.


REMOVE STEERING HYDRAULIC PUMP AND SPACER.
REMOVE TWO SCREWS AND LOCK WASHERS.

STEP 2. REMOVE TWO SCREWS AND LOCK WASHERS SECURING PUMP TO TRANSMISSION.

STEP 3. REMOVE STEERING HYDRAULIC PUMP AND SPACER FROM TRANSMISSION.

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Figure 3-62. Power steering pump, removal and installation.

control valve (fig. 3-56). When the engine is operating at idle speed the pump does not supply enough flow to operate the steering cylinders. The demand valve then diverts additional oil from the tandem hydraulic pump to the steering control valve to operate the steering cylinders. When engine speed is high enough the steering pump supplies adequate flow to operate the steering system.

b. Removal.

(1) Remove filler plug (8, fig. 3-64) from strainer cover on hydraulic reservoir.

(2) Remove screws and remove strainer cover (12, fig. 3-64) from hydraulic reservoir.

(3) Remove magnet and strainer assembly from reservoir.

(4) Remove drain plug (46) and drain hydraulic reservoir into a suitable container.

(5) Place filler plug over the hole left by removing the magnet and strainer assembly from reservoir.

(6) Remove screws and side panel on left side of air cleaner shield.

(7) Refer to figure 3-62 and remove the steering hydraulic pump.

c. Installation.

(1) Refer to figure 3-62 and install the steering hydraulic pump. Coat pump splines with GAA lubricant. Coat spacer with gasket forming compound before installation.

(2) Install drain plug and gasket.

(3) Refer to paragraph 3-91 and install the tandem hydraulic pump.

(4) Install magnet and strainer assembly and strainer cover on hydraulic reservoir. Fill hydraulic reservoir with correct grade of oil. Refer to paragraph 3-4. Start engine and run for several minutes. Stop engine and recheck oil level, if necessary.

3-91. Tandem Hydraulic Pump

a. General. The tandem hydraulic pump (fig. 3-56) is mounted on, and driven by a shaft, extending from the torque converter charging pump. Whenever the engine is operating the pump is running. Oil is bypassed through the pump and returned to the reservoir when not required to operate the hydraulic system of the loader.

b. Removal.

(1) Refer to paragraph 3-90 and remove the magnet and strainer assembly from the hydraulic reservoir.

(2) Refer to paragraph 3-90 and drain reservoir.

(3) Remove hose assemblies (5 and 6, fig. 3-63) from the pump and drain into a suitable container.

(4) Remove two suction tubes (13 and 14) from pump and allow to drain into a suitable container.

Note: Plug or cap all openings in hoses, tubes, pumps, and valves to prevent entrance of foreign material.

(5) Remove four screws (15) and lock washers (16) and remove pump (17) from loader.

(6) Remove pump carefully from transmission mounting pad. Place a protective cover over splined shaft on pump and mounting pad on transmission to prevent any foreign material from entering transmission.

c. Installation.

(1) Remove protective cover from splined shaft of pump (17, fig. 3-63) and coat splines with grease (GAA) and install pump on transmission.

(2) Install the tandem hydraulic pump and secure with four screws (15) and lock washers (16). Connect suction tubes (13 and 14) and hose assemblies (5 and 6) to pump.

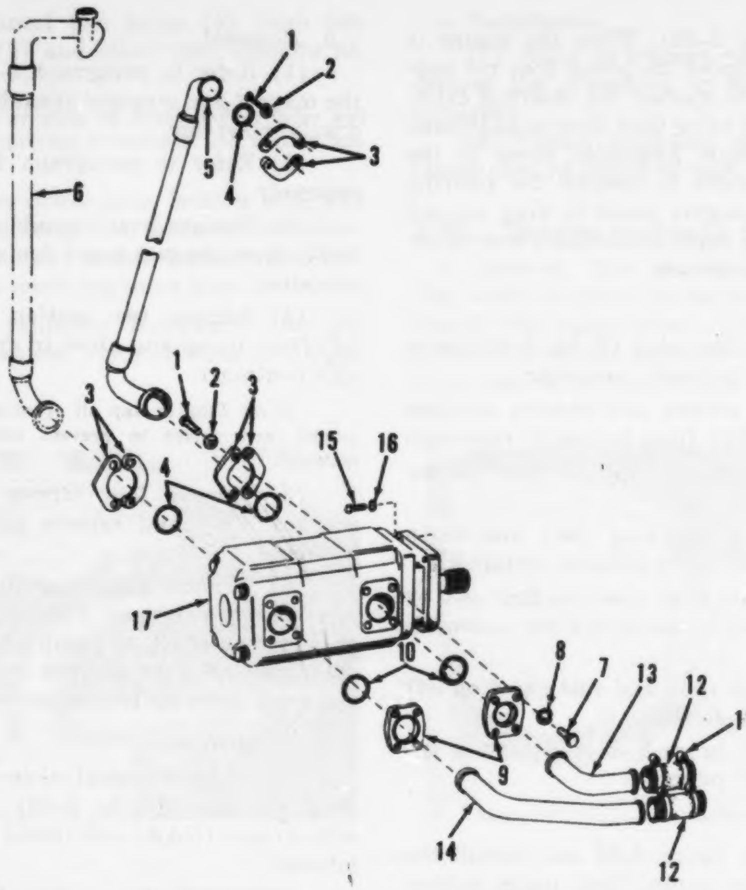
(3) Refer to paragraph 3-90 and install the magnet and strainer assembly and the strainer cover on the hydraulic reservoir. Refer to paragraph 3-90 and fill reservoir.

(4) Start engine and check pump and lines for leaks. Operate hydraulic controls and check operation.

3-92. Hydraulic Reservoir

a. General. The reservoir for the hydraulic system is mounted directly behind the operator. Hoses and tubes lead to the two pumps and return from the control valve and demand valve to the reservoir. The following accessories are components of the hydraulic reservoir.

(1) *Magnet and strainer assembly.* Metal in the oil are picked up and retained by the



1 Screw, cap, hex-head, 7/16-14 x 1-1/4 in. (16 rqr)
2 Washer, lock, 7/16 in. (16 rqr)
3 Flange half (8 rqr)
4 Preformed packing (4 rqr)
5 Hose, pump to control valve
6 Hose, pump to demand valve
7 Screw, cap, hex-head, 1/2-13 x 1-1/4 in. (8 rqr)
8 Washer, lock, 1/2 in. (8 rqr)
9 Pipe flange (2 rqr)
10 Preformed packing (2 rqr)
11 Hose clamp (4 rqr)
12 Hose (2 rqr)
13 Tube, suction, reservoir to pump
14 Tube, suction, reservoir to pump
15 Screw, cap, hex-head (4 rqr)
16 Washer, lock (4 rqr)
17 Tandem hydraulic pump

MEC 3805-239-12/3-63

Figure 3-63. Tandem hydraulic pump and hoses, exploded view.

magnet. The strainer removes foreign material from the oil. A separate strainer, mounted below the filler plug, strains the oil as it is poured into the reservoir.

(2) *Vacuum pressure relief valve.* This valve, mounted in the strainer cover, relieves internal pressure to prevent rupture of the reservoir and also admits air to guard against a vacuum forming in the system.

(3) *Oil filter.* An oil filter, located in the reservoir beneath the filter cover, filters the oil as it circulates through the system. A bypass valve, mounted with the filter, will bypass the

oil around the filter should the filter become clogged.

b. Service.

(1) *Oil filter.* The oil filter element should be replaced every 250 hours of operation.

(*a*) Release latches and open hinged access cover above tank. Clean top of tank and covers thoroughly.

(*b*) Remove screws (1, fig. 3–64) and lock washers (2) and remove cover (3) and preformed packing (4). Discard packing.

(*c*) Remove bypass valve (5) and plate (6) and lift filter element (7) from reservoir (48).

(*d*) Clean the interior of the filter compartment in the reservoir thoroughly.

(*e*) Install new filter element (7) in compartment, with element centered on outlet tube at bottom of compartment.

(*f*) Refer to figure 3–63 and install the bypass valve (5) and filter cover (3). Tighten screws (1) to a torque of 29 to 32 foot-pounds.

(2) *Vacuum-pressure relief valve.* The vacuum-pressure relief valve filter element should be checked every 250 hours for cleanliness and replaced every 1000 hours.

(*a*) Remove vacuum-pressure relief valve (9, fig. 3–64) from cover.

(*b*) Refer to figure 3–65 and disassemble the vacuum-pressure relief valve to inspect or replace the filter element.

(*c*) Refer to figure 3–65 and assemble the vacuum-pressure relief valve.

(*d*) Install relief valve in cover.

(3) *Strainer and magnet.* The strainer and magnet are suspended in a cage over the outlet openings of the reservoir. All oil leaving the reservoir passes through the strainer and magnet. The strainer and magnet should be cleaned every 250 hours of operation.

(*a*) Refer to figure 3–64 and remove cover (12) from the reservoir. Remove and discard packing (13).

(*b*) Reach through opening and grasp cage (18) and lift strainer and magnet from reservoir.

(*c*) Disconnect bail (19) from cage and remove baffle (20), strainer (21), and magnet (22) from cage.

(*d*) Remove screws (14) and washers and remove strainer (17) from cover.

(*e*) Clean all parts with cleaning compound, solvent (Fed P–S–661) and dry thoroughly with compressed air.

(*f*) Install parts in reservoir and install cover (3) on reservoir.

(4) *Oil level check.* Check oil level after each 10 hours of operation. Park the loader on firm level ground. Place transmission in neutral and depress accelerator to run engine at full throttle.

(*a*) Operate boom control lever (fig. 2–3) and raise boom to the horizontal position.

(*b*) Turn steering wheel to full left and full right turns and then bring front section to in line position.

(*c*) Operate bucket and clam control lever (fig. 2–3) to open and close bucket and open and close clam several times.

(*d*) Raise boom and float bucket to ground, several times. Then, with bucket on ground, place boom control lever in neutral position. Open bucket to place cutting edge of bucket on ground with clam closed.

(*e*) With engine at idle relieve pressure in hydraulic reservoir by slowly loosening filler plug (8, fig. 3–64).

(*f*) Remove fluid level gage (45) from reservoir, wipe dry with a clean rag and rest gage in opening. Remove gage and check level of fluid. Level must be between FULL and ADD marks on gage.

(*g*) If level is below ADD mark, add oil as necessary to bring to correct level. Refer to paragraph 3–4 for correct grade of oil.

(*h*) Install filler plug and gage.

(5) *Draining, flushing, and filling hydraulic system.* Every 1000 hours the hydraulic system should be drained, flushed, and refilled with new oil.

(*a*) Start engine and operate hydraulic system to bring oil to operating temperature.

(*b*) Raise boom and fully extend bucket and clam cylinders.

(*c*) Raise boom to full height. Retract bucket and clam cylinders all the way. Place all control levers in neutral position and stop engine.

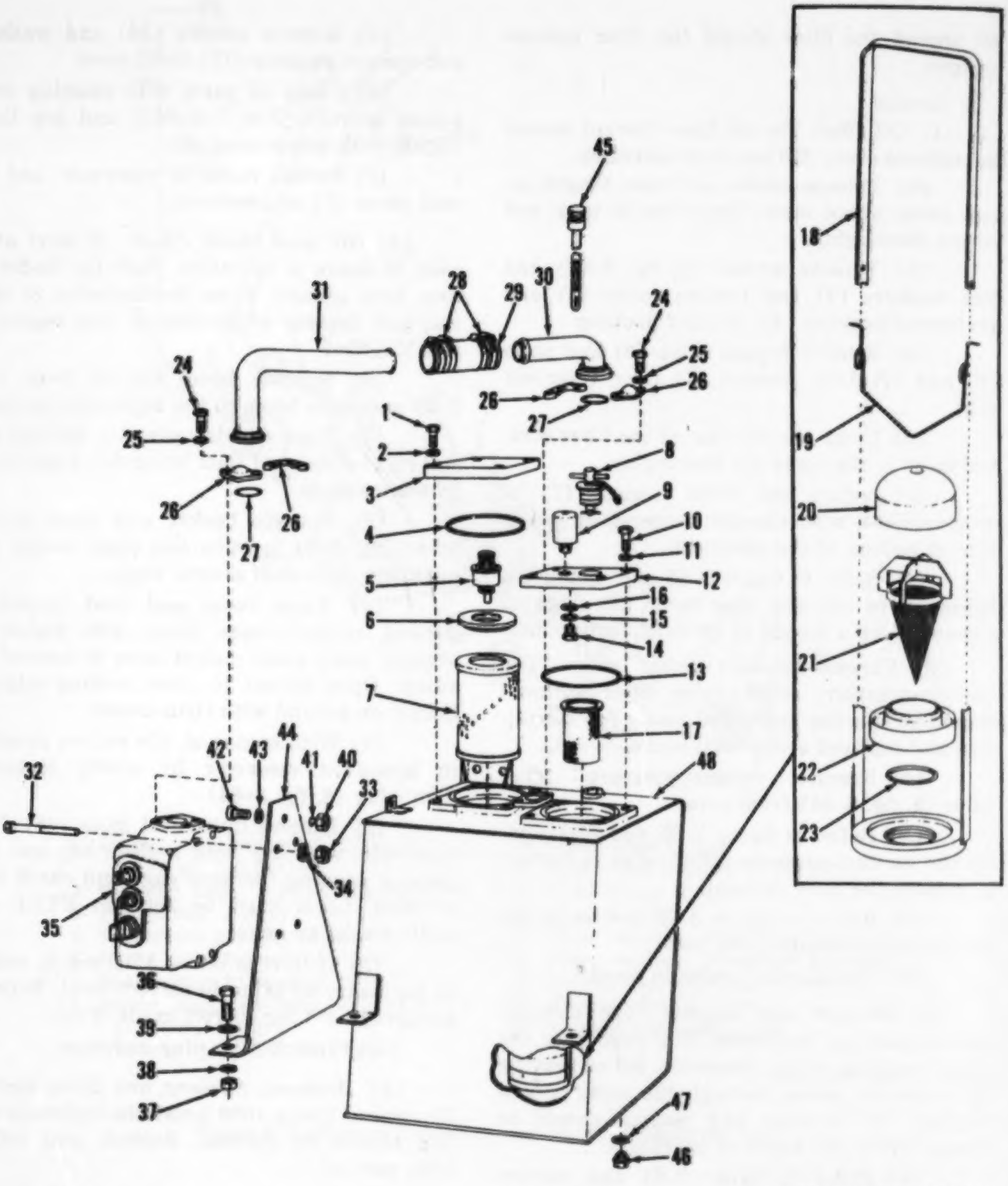


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Figure 3–64. Hydraulic reservoir and control valve, exploded view.

Figure 3-64—Continued.

1	Screw, cap, hex-head, ⅝-24 x 1½ in. (4)
2	Washer, lock, ⅝ in. (4)
3	Filter cover
4	Preformed packing
5	Bypass valve
6	Valve plate
7	Filter element
8	Filler plug
9	Vacuum pressure relief valve
10	Screw, cap, hex-head, ⅝-24 x 1½ in (4)
11	Washer, lock, ⅝ in. (4)
12	Strainer cover
13	Preformed packing
14	Screw, cap, hex-head, ⅝-24 x ⅝ in. (3)
15	Washer, lock, ⅝ in. (3)
16	Washer, flat, ⅝ in (3)
17	Filler strainer
18	Magnet and strainer cage
19	Bail
20	Baffle
21	Outlet strainer
22	Magnet
23	Preformed packing
24	Screw, cap, hex-head, ½-13 x 1½ in. (8)
25	Washer, lock, ½ in (8)
26	Flange half (4)
27	Preformed packing (2)
28	Hose clamp (4)
29	Hose
30	Tube, valve to reservoir
31	Tube, valve to reservoir
32	Screw, cap, hex-head, ½-13 x 5½ in (4)
33	Nut, ½-13 (4)
34	Washer, lock, ½ in. (4)
35	Control valve assembly
36	Screw, cap, hex-head, ½-13 x 1¼ in. (2)
37	Nut, ½-13 (2)
38	Washer, lock, ½ in. (2)
39	Washer, flat, ½ in (2)
40	Nut, ⅝-24
41	Washer, lock, ⅝ in.
42	Screw, cap, hex-head, ⅝-24 x 1½ in.
43	Washer, flat, ⅝ in.
44	Valve bracket
45	Fluid level gage
46	Drain plug
47	Gasket
48	Reservoir

(*d*) Support boom with suitable supports to keep it from lowering while draining reservoir.

(*e*) Remove drain plug (46, fig. 3–64) and gasket (47) and drain oil from reservoir into a suitable container.

(*f*) Remove supports from under boom. Move boom control lever to LOWER position and lower boom to expel oil from lift cylinders.

(*g*) Place bucket and clam control lever forward in dump position and use an external power source connected to bucket to completely extend dump cylinders.

(*h*) Place bucket and clam control lever in left or close position and use an external power source to close clam and expel oil from cylinders.

(*i*) Refer to (1), (2), and (3) above and replace filter elements and clean strainers and magnets in hydraulic reservoir.

(*j*) Install drain plug and gasket. Fill hydraulic reservoir completely with kerosene (Fed VV-K-211B). Start engine and run at idle speed to circulate kerosene through system. Operate control levers several times to flush system. Do not operate steering system.

(*k*) Drain kerosene from hydraulic system ((*b*) through (*h*) above). Install drain plug (46, fig. 3–64) and gasket (47) and fill hydraulic reservoir to top with new oil. Refer to paragraph 3–4 for correct grade of oil. Install filler plug.

(*l*) Start the engine and operate boom and bucket controls to fill lift, dump and clam cylinders with oil. Check oil level in tank and keep suction lines filled by adding oil as necessary.

(*m*) Allow a few minutes for oil to settle after filling cylinders. Check oil level by removing fluid level gage. Add oil as necessary to bring to correct level.

(6) *General maintenance.* To keep the hydraulic system in good working condition and down time to a minimum the following steps should be adhered to.

(*a*) Thoroughly clean all parts before removing or installing.

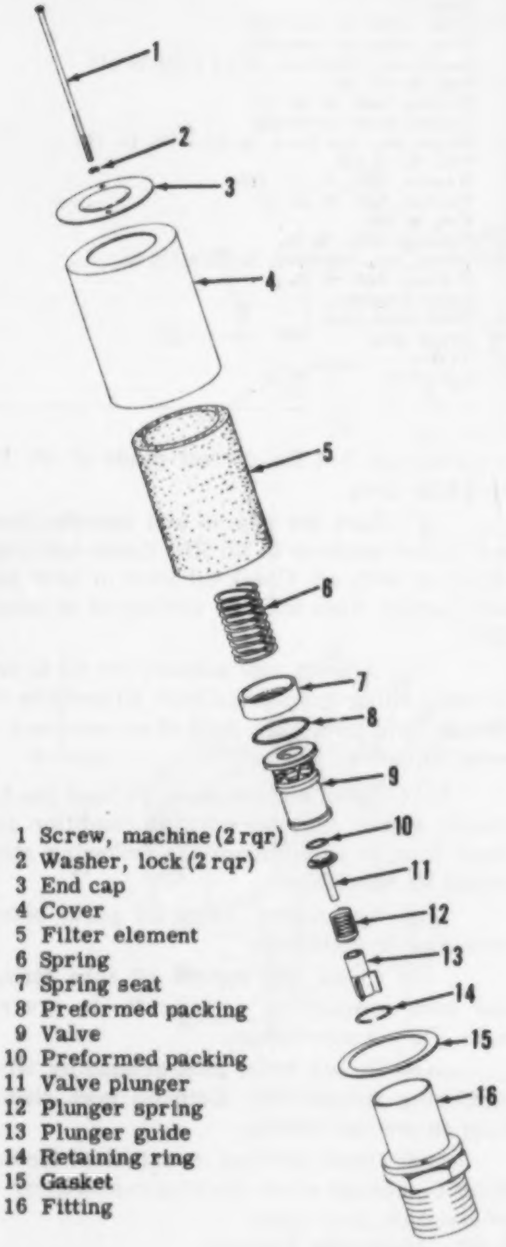
(*b*) Check and tighten all tube fittings and hose connections periodically to prevent leaks. Do not overtighten.

(*c*) Do not twist hose assemblies when tightening connections. Keep all hose clamps tight to prevent chafing.

(*d*) Check packing on cylinders for evidence of leakage when checking connections.

3–93. Hydraulic Controls

a. General. Control of hydraulic operation is maintained by the control valve (35, fig. 3–64) mounted on a bracket at the right side of the hydraulic reservoir. The valve is of the three



1	Screw, machine (2 rqr)
2	Washer, lock (2 rqr)
3	End cap
4	Cover
5	Filter element
6	Spring
7	Spring seat
8	Preformed packing
9	Valve
10	Preformed packing
11	Valve plunger
12	Plunger spring
13	Plunger guide
14	Retaining ring
15	Gasket
16	Fitting

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Figure 3-65. Vacuum-pressure relief valve, exploded view.

spool type with the movement of the spools controlling boom, bucket, and clam motions. Two control levers, positioned by the operator, are connected to the spools by a linkage. One lever operates the boom cylinders and has four positions; raise, neutral, lower, and float. The second lever also has four positions and controls the other two spools. Moving the lever forward will dump the bucket, and moving it back will retract the bucket. When the lever is moved to the left the clam opens. Moving the lever to the right closes the clam. To facilitate ease of operation, the boom lever can be held in operating position and the bucket lever moved to operate the bucket, with bucket operations overriding the boom control. The boom control lever will stay in position and must be manually moved to change positions. The bucket control lever will automatically return to neutral when released and must be held in position to keep any movement in operation.

b. Removal. Refer to figure 3-66 and remove the control levers and linkage.

c. Installation. Refer to figure 3-66 and install the control levers and linkage. Lubricate linkage pivot points with oil (OE) after installation.

d. Adjustment. After installation, adjust linkage as follows:

(1) Move control levers through all operations. Check movement of spools in valve.

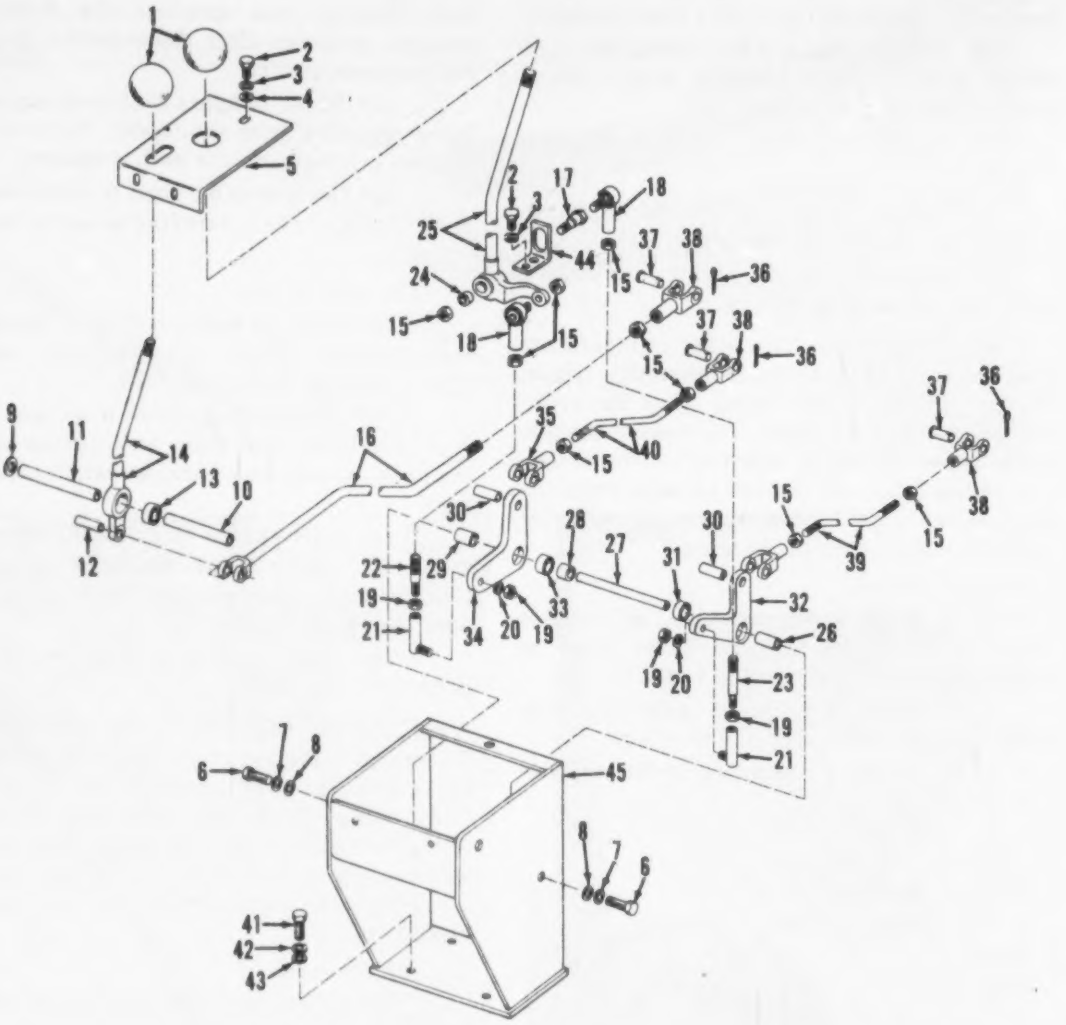
(2) Adjust length of control rods (16, 22, 23, 39, and 40, fig. 3-66) to position spools as required to perform functions properly.

(3) Rods must be adjusted so that when control lever is in neutral position no movement or chatter is evident in the cylinders.

3-94. Hydraulic Cylinders

a. General. The force required to move the boom, open the bucket, and operate the clam is provided by the hydraulic cylinders. The cylinder rods extend and retract under pressure of the hydraulic fluid. The cylinders are connected to the loader operating parts with pins which allow the parts to pivot when the cylinders extend and retract.

b. Adjustment. The cylinders have packing around the rod. This packing must be properly adjusted to prevent oil leakage.



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1	Ball knob (2)
2	Screw cap, hex-head, ⅜-16 x ¾ in. (4)
3	Washer, lock, ⅜ in. (4)
4	Washer, flat, ⅜ in. (3)
5	Cover plate
6	Screw, cap, hex-head, ⅜-16 x 1 in. (4)
7	Washer, lock, ⅜ in. (3)
8	Washer, flat, ⅜ in. (3)
9	Washer, flat
10	Spacer
11	Snaft
12	Pin, spring
13	Bearing
14	Boom control lever
15	Nut, ½-20 (8)
16	Control rod
17	Pin, threaded
18	Ball joint (2)
19	Nut, ⅜-24 (4)
20	Washer, lock, ⅜ in. (2)
21	Ball joint (2)
22	Rod
23	Rod
24	Bearing
25	Bucket and clam control lever
26	Spacer
27	Shaft
28	Spacer
29	Spacer
30	Pin, spring (2)
31	Bearing
32	Lever
33	Bearing
34	Lever
35	Clevis (2)
36	Pin, cotter, ¼ x 1 in. (3)
37	Pin (3)
38	Clevis (3)
39	Control rod
40	Control rod
41	Screw, cap, hex-head, ⅜-16 x 2 in. (4)
42	Washer flat, ⅜ in. (4)
43	Washer, lock, ⅜ in. (4)
44	Bracket
45	Control support

Figure 3-66. Hydraulic control linkage, exploded view.

(1) If cylinder shows evidence of leaking, remove the lock wire (fig. 3-67) from screws.

(2) Tighten the screws alternately and evenly using a slight pressure with a short wrench. Do not overtighten.

(3) Install lock wire after tightening screws.

(4) Operate loader and check cylinder operation for evidence of leakage.

(5) Replace cylinder packing if adjustment does not correct leaking.

b. Boom Cylinders. The boom cylinders are attached at an angle to the front section frame. Bearing mounts in the frame allow the cylinders to pivot for operation. The ends of the piston rods are pinned to brackets on the underside of the boom. As the rod extends from the cylinder the boom is pushed upward with the cylinders pivoting on the bearings.

(1) *Removal.*

(*a*) Raise boom as high as possible (para 2-14). Install support under boom to prevent accidental lowering of boom.

(*b*) Clean outside of cylinders (fig. 3-68) and area around hose connections.

(*c*) Support cylinders with suitable blocking or a hoist before removing connecting pins. Plug all hose openings (fig. 3-68) and cylinder openings after disconnection to prevent entrance of dirt.

(*d*) Refer to figure 3-68 and remove the boom cylinders from the loader. Removal procedures are the same for both cylinders.

(*e*) Use a suitable hoist to remove cylinders. Use care when removing so as not to drop cylinder.

(2) *Installation.*

(*a*) Refer to figure 3-68 and install the boom cylinder. Raise cylinders into position with a suitable hoist.

(*b*) Remove plugs from hoses and openings in cylinder and clean area before installing hoses. Install new packings when installing hose.

(*c*) Start engine (para 2-12) and operate boom (para 2-14) to check operation. Check hose connections (fig. 3-68) and cylinders (fig. 3-68) for leaks.

(*d*) Check hydraulic reservoir for proper level (para 3-92)

c. Dump Cylinders. The dump or bucket cylinders are connected to the top of the front section frame and to the center of the cross links. Dump links connect the cross links to the top of the bucket. Extension of the cylinder rod pivots the top of the cross links forward, and in turn, dump the bucket. Retraction reverses this procedure.

(1) *Removal.*

(*a*) Lower bucket to ground and shutoff engine.

(*b*) Clean outside of cylinders and area around hose connections.

(*c*) Support cylinder with suitable blocking before removing connecting pins. Plug all hose openings and cylinder openings after disconnection to prevent entrance of dirt.

(*d*) Refer to figure 3-69 and remove the dump cylinders from the loader. Removal procedures are the same for both cylinders.

Note. The right dump cylinder has a bucket position indicator installed on top.

(*e*) Use a suitable hoist to remove cylinder. Use care when removing so as not to drop cylinder.

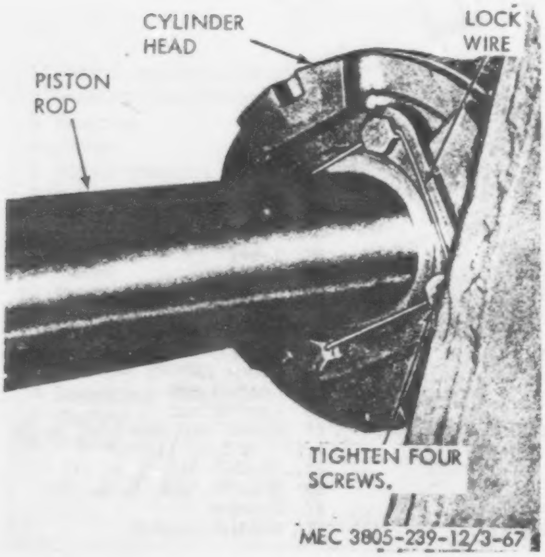
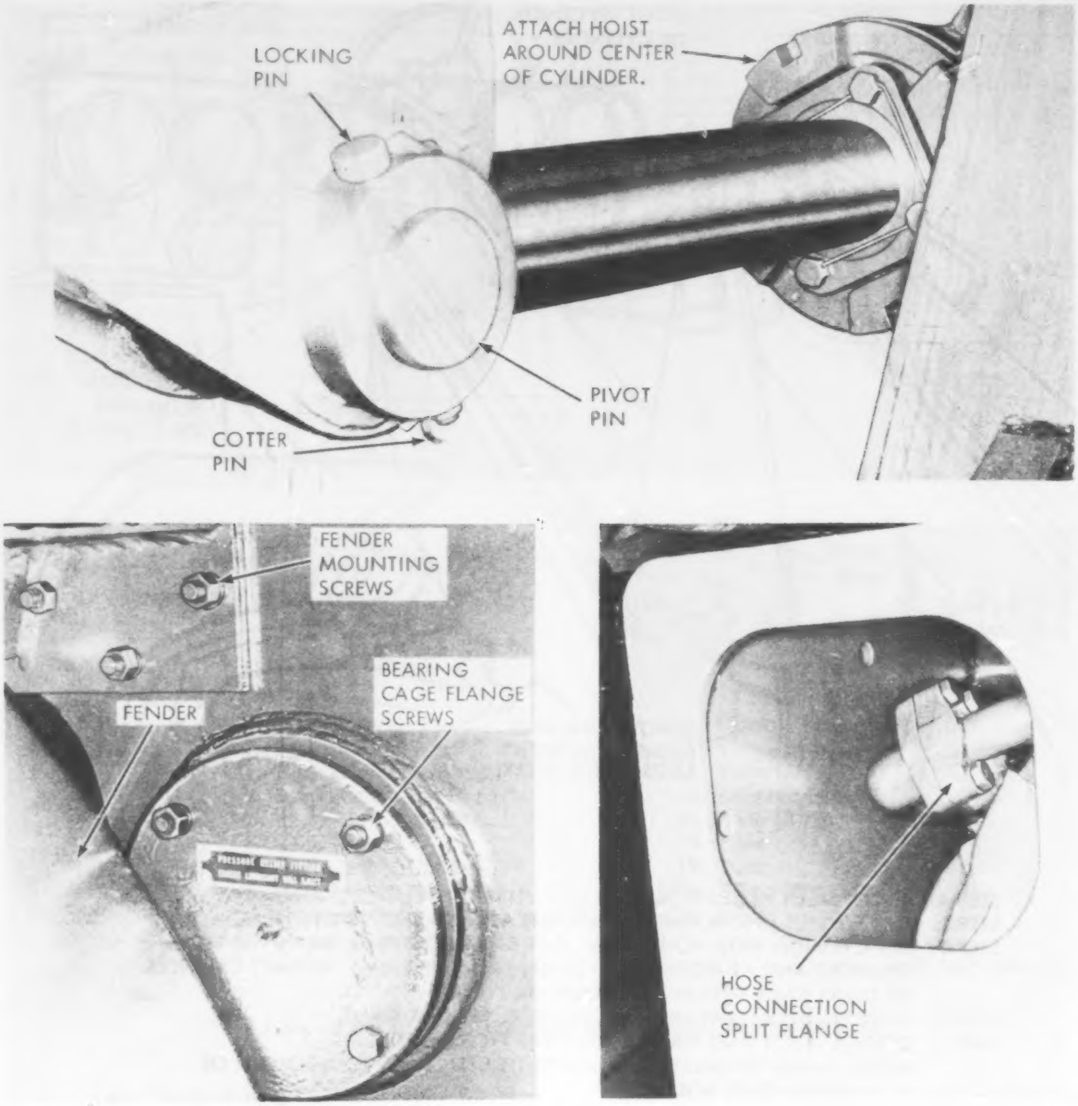


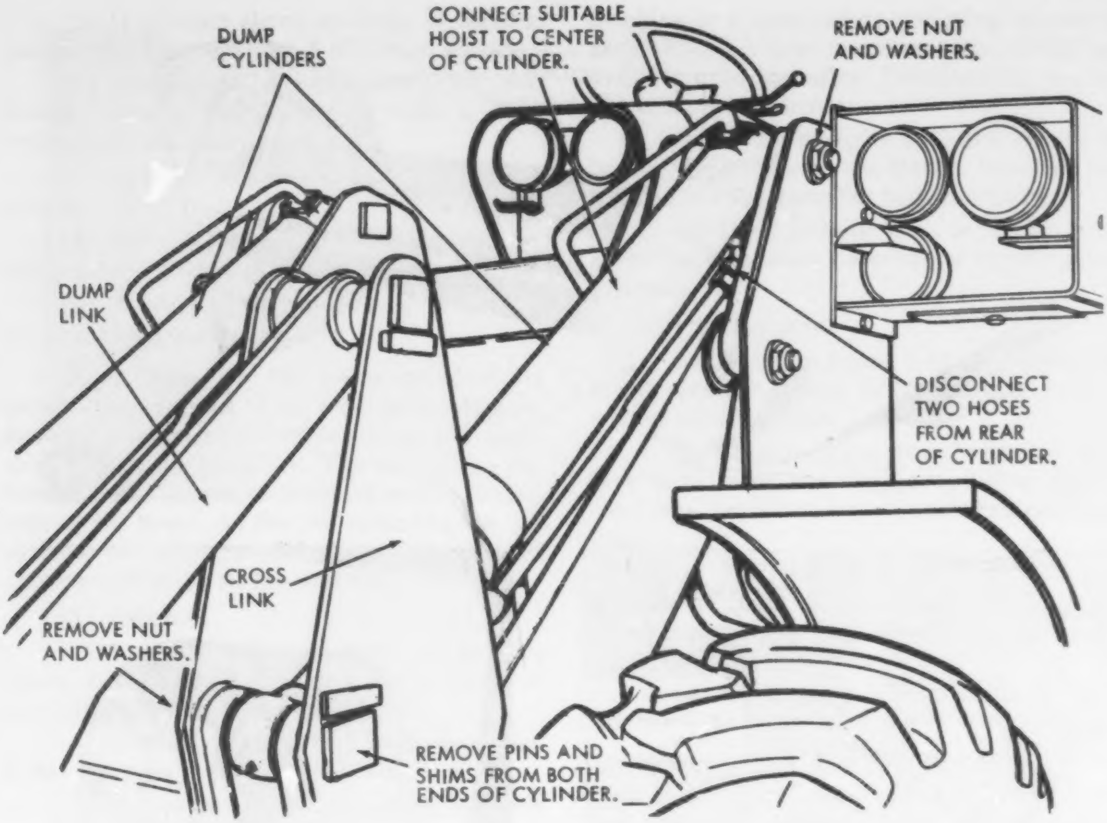
Figure 3-67. Adjusting cylinder packing.


LOCKING PIN
ATTACH HOIST AROUND CENTER OF CYLINDER.
PIVOT PIN
COTTER PIN
FENDER MOUNTING SCREWS
BEARING CAGE FLANGE SCREWS
FENDER
HOSE CONNECTION SPLIT FLANGE

STEP 1. RAISE BOOM AS HIGH AS POSSIBLE. INSTALL SUPPORT UNDER BOOM TO PREVENT ACCIDENTAL LOWERING OF BOOM.
STEP 2. HOOK SUITABLE HOIST TO BOOM CYLINDER TO SUPPORT CYLINDER.
STEP 3. REMOVE SIX SCREWS AND REMOVE FENDER.
STEP 4. REMOVE COTTER PIN AND LOCKING PIN FROM FRONT END OF BOOM CYLINDER. REMOVE PIVOT PIN AND SPACING WASHERS.
STEP 5. DISCONNECT TWO HOSES FROM REAR OF CYLINDER. PLUG OPENINGS.
STEP 6. REMOVE EIGHT SCREWS, NUTS, AND WASHERS AND REMOVE BEARING CAGES FROM CYLINDER AND FRAME.
STEP 7. REMOVE CYLINDER FROM LOADER USING HOIST TO LIFT CYLINDER.
NOTE: WHEN INSTALLING BEARING CAGES TIGHTEN FLANGE NUTS TO A TORQUE OF 55 TO 65 FOOT POUNDS.

MEC 3805-239-12/3-68

Figure 3-68. Boom cylinder, removal and installation.


DUMP CYLINDERS
CONNECT SUITABLE HOIST TO CENTER OF CYLINDER.
REMOVE NUT AND WASHERS.
DUMP LINK
DISCONNECT TWO HOSES FROM REAR OF CYLINDER.
CROSS LINK
REMOVE NUT AND WASHERS.
REMOVE PINS AND SHIMS FROM BOTH ENDS OF CYLINDER.

STEP 1. DISCONNECT HOSES FROM REAR OF CYLINDER. PLUG OPENINGS.
STEP 2. REMOVE NUT AND WASHERS FROM PINS AT EACH END OF CYLINDER.
STEP 3. LIFT CYLINDER WITH HOIST TO REMOVE STRAIN ON PINS. DRIVE PIN FROM CYLINDER AND AT FRONT OF CYLINDER, REMOVE SHIMS. RETRACT CYLINDER TO CLEAR LINKS WITH PISTON ROD END.
STEP 4. DRIVE PIN FROM REAR END OF CYLINDER. REMOVE SHIMS.
STEP 5. OPERATE HOIST AND REMOVE CYLINDER FROM LOADER.
NOTE: WHEN INSTALLING CYLINDER TIGHTEN NUTS TO A TORQUE OF 475-500 FOOT POUNDS.

MEC 3805-239-12/3-69

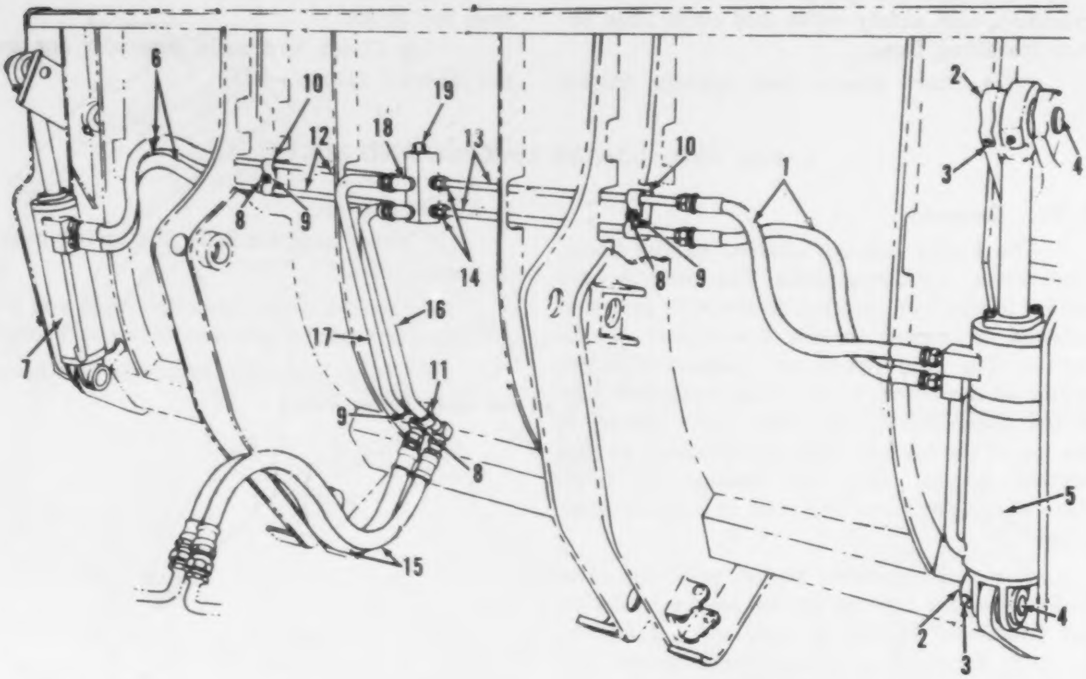
Figure 3-69. Dump cylinders, removal and installation.

(2) *Installation.*

(*a*) Refer to figure 3-69 and install the dump cylinder. Raise cylinders into position with a suitable hoist.

(*b*) Remove plugs from hoses and openings in cylinder and clean area before installing hoses. Install new packing when installing hoses.

(*c*) Start engine and operate hydraulic system. Check hose connections and cylinders for leaks.



1	Hose (2 rqr)
2	Pin, cotter, 1/8 x 1 in. (4 rqr)
3	Pin, retaining (4 rqr)
4	Pin, connecting (4 rqr)
5	Right clam cylinder
6	Hose (2 rqr)
7	Left clam cylinder
8	Nut, 3/8-16 (3 rqr)
9	Washer, lock, 3/8 in. (3 rqr)
10	Clamp (2 rqr)
11	Clamp
12	Tube (2 rqr)
13	Tube (2 rqr)
14	Adapter (4 rqr)
15	Hose (2 rqr)
16	Tube
17	Tube
18	Elbow (2 rqr)
19	Safety valve

MEC 3805-239-12/3-70

Figure 3-70. Clam cylinders and lines, removal and installation.

(*d*) Check hydraulic reservoir for proper oil level (para 3-92).

d. Clam Cylinders. The two clam cylinders, one mounted on each side of the bucket, operate the clam. When the cylinder rods are retracted the clam is opened. A safety valve, mounted in the center of the bucket, acts as a relief valve to protect the clam and bucket from shock loads while in the open position.

(1) *Removal*

(*a*) Clean cylinders and areas around hose and tube connections and safety valve.

(*b*) Refer to figure 3-70 and remove clam cylinders, lines, and safety valve. Support cylinders before removing connecting pins (4, fig. 3-69). Plug all hose, lines, and cylinder openings after disconnecting.

(2) *Installation*

(*a*) Refer to figure 3-70 and install clam cylinders, lines, and safety valve.

(*b*) Remove plugs from hoses, tubes, cylinders, and safety valve and clean area before installing lines.

(*c*) Start engine and operate bucket clam and check operation. Check cylinders and lines for leaks.

(*d*) Check hydraulic reservoir for proper oil level (para 2–92).

Section XVIII. LOADER LINKAGE AND BUCKET

3–95. General

a. The loader linkage consists of the boom, cross links, and dump links. The boom is connected to the front section frame with pins and extends to connect to the lower part of the bucket. The cross links are connected to the center of the boom, to the dump cylinders, and to the dump links. The dump links extend to the top of the bucket. Pins and bearings at connection points allow the linkage to pivot through all positions required in loading operations.

b. The multi-purpose bucket with the clam makes possible the use of the loader in different functions. It can be used as a bulldozer, scraper, clamshell, or conventional bucket. The main components of the bucket are the moldboard, the pivoted clam and the cylinders. Teeth mounted on the front of the clam aid in penetrating hard material.

3–96. Bucket

a. Removal.

(1) Operate loader to rest bucket level on blocks or suitable supports.

(2) Refer to figure 3–71 and remove the bucket.

(3) Plug openings in hoses and connecting points after disconnecting.

b. Disassembly.

(1) Refer to paragraph 3–94 and remove cylinders and lines from the bucket.

(2) Refer to figure 3–72 and remove teeth and blades from bucket.

c. Reassembly.

(1) Refer to figure 3–72 and install teeth and blades on bucket.

(2) Tighten plow bolts (16) to a torque of 400 to 430 foot-pounds and tighten capscrews (4&5) to a torque of 240–260 foot-pounds.

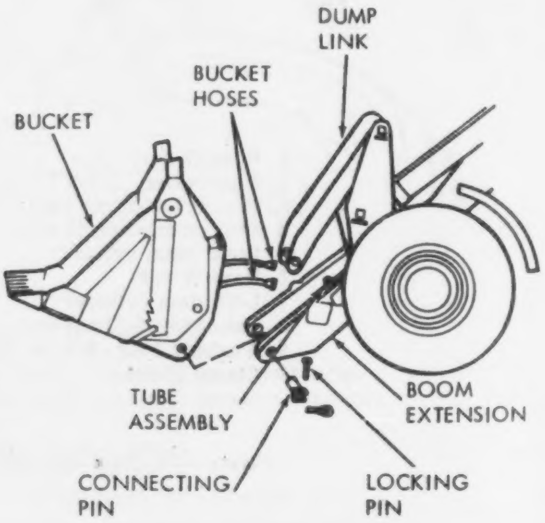
(3) Refer to paragraph 3–94 and install cylinders and lines on the bucket.

d. Installation.

(1) Refer to figure 3–71 and install bucket on loader.

(2) Remove plugs from openings and connect bucket hoses to tube assemblies on boom.

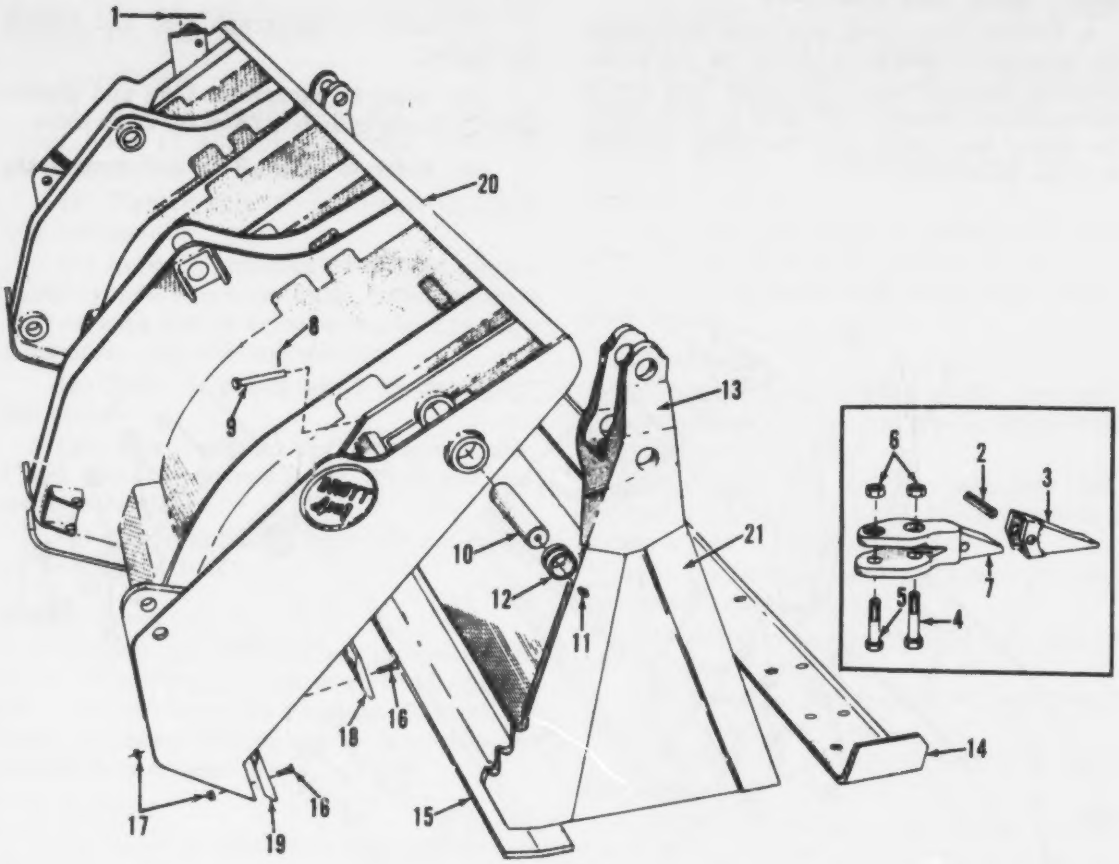
(3) Check hydraulic reservoir for proper oil level (para 3–92).



STEP 1. DISCONNECT BUCKET HOSES FROM TUBE ASSEMBLIES. PLUG ALL OPENINGS.
STEP 2. REMOVE FOUR COTTER PINS, LOCKING PINS, AND CONNECTING PINS FROM BUCKET, LIFT LINKS, AND BOOM EXTENSION.
STEP 3. OPERATE LOADER AND MOVE LOADER BACK AWAY FROM BUCKET.

MEC 3805-239-12/3-71

Figure 3–71. Bucket, removal and installation.



1 Clam position indicator
2 Pin, spring, 1/2 x 2-1/2 in. (9 rqr)
3 Tip, bucket tooth (9 rqr)
4 Screw, cap, hex-head, 5/8-11 x 3-1/4 in. (9 rqr)
5 Screw, cap, hex-head, 5/8-11 x 3 in. (9 rqr)
6 Nut, 5/8-11 (18 rqr)
7 Shank, bucket tooth (9 rqr)
8 Pin, cotter, 1/8 x 1 in. (2 rqr)
9 Pin, locking (2 rqr)
10 Pivot pin (2 rqr)
11 Lubricating fitting
12 Bearing
13 Clam hinge (2 rqr) (welded)
14 Bucket blade (welded)
15 Clam blade (welded)
16 Bolt, plow, 3/4-10 x 2 in. (19 rqr)
17 Nut, 3/4-10 (19 rqr)
18 Moldboard blade
19 Moldboard end bit (2 rqr)
20 Bucket moldboard
21 Bucket clam

MEC 3805-239-12/3-72

Figure 3-72. Bucket, exploded view.

3–97. Dump and Cross Links

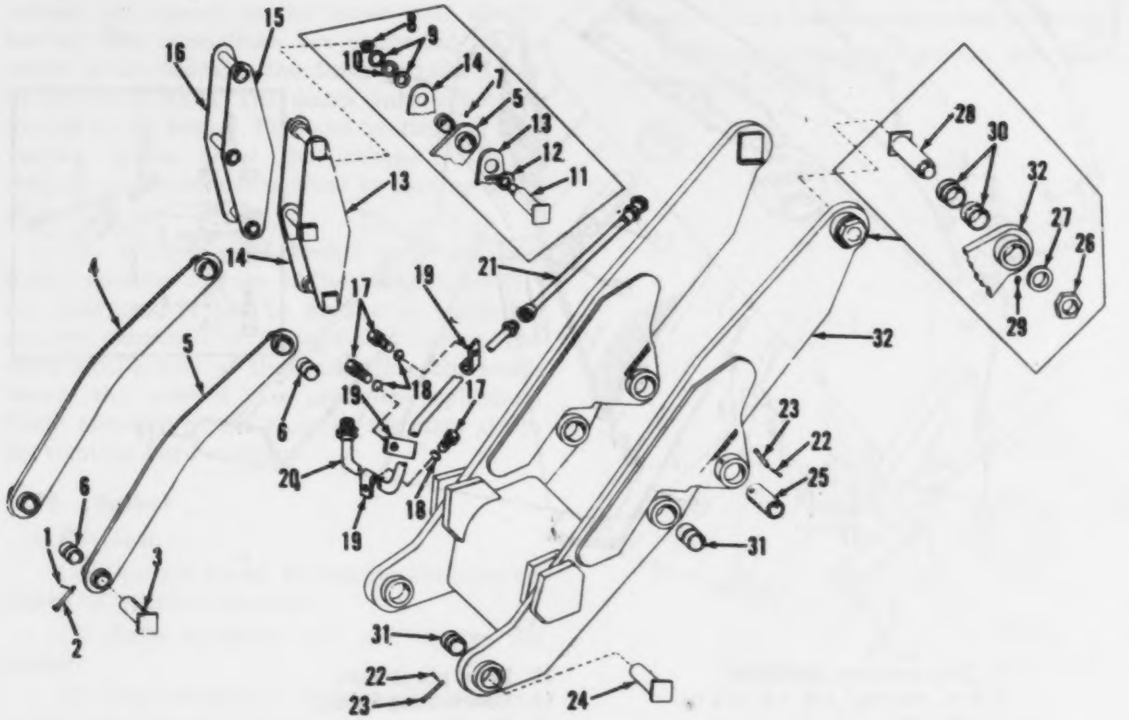
a. General. The dump and cross links provide attachment and pivot points for the cylinders and bucket linkage. The cross links are in pairs and are attached with pins to each other, the boom, the frame, and the dump cylinder with the pivot pins.

b. Removal.

(1) Refer to paragraph 3–96 and remove the bucket.

(2) Refer to paragraph 3–94 and disconnect the dump cylinders from the cross links.

(3) Refer to figure 3–73 and remove the



MEC 3805-239-12/3-73

1	Pin, cotter, 3/16 x 1½ in. (2)	17	Screw, cap, hex-head, ⅜–16 x ¾ in. (6)
2	Pin, locking (2)	18	Washer, lock, ⅜ in. (6)
3	Pivot pin (2)	19	Clamp (6)
4	Right dump link	20	Tube, to clam cylinder (2)
5	Left dump link	21	Hose (2)
6	Bearing (4)	22	Pin, cotter, 3/16 x 1½ in. (4)
7	Lubrication fitting (2 rqr)	23	Pin, locking (4)
8	Nut 1½ (6)	24	Pivot pin (2)
9	Washer, flat, 1½ in. (6)	25	Pivot pin, cylinder (2)
10	Washer, spacing (as rqr)	26	Nut, 1¾ (2)
11	Pivot pin (6)	27	Washer, flat (2)
12	Washer, flat (2) (cylinder pin)	28	Pivot pin (2)
13	Left outer cross link	29	Lubrication fitting
14	Left inner cross link	30	Bearing (4)
15	Right inner cross link	31	Bearing (4)
16	Right outer cross link	32	Boom

Figure 3–73. Boom and linkage, exploded view.

dump links (4 and 5) and cross links (13 through 16) from the loader.

c. Installation.

(1) Refer to figure 3–73 and install the dump links (4 and 5) and cross links (16 through 13) on the loader.

(2) Tighten nuts (8) to a torque of 375 to 400 foot-pounds.

(3) Refer to paragraph 3–94 and connect dump cylinders to cross links. Install washers (12) on each side of cylinder rod lugs to allow a maximum of 0.125 inch side play.

(4) Refer to paragraph 3–96 and install the bucket.

(5) Start engine and operate loader. Check operation. Check hoses, tubes, and connections for leaks.

(6) Check hydraulic reservoir for proper oil level (para 3–92).

3–98. Boom

a. General. The boom raises and lowers the bucket when lift cylinders operate. Attached to the inner portion of the boom are the hydraulic tubes and hoses leading out to connect to the bucket clam cylinder hoses.

b. Removal.

(1) Refer to paragraph 3–96 and remove the bucket.

(2) Refer to paragraph 3–97 and remove the dump and cross links.

(3) Refer to paragraph 3–94 and disconnect the lift cylinders from the boom.

(4) Remove clamps (19, fig. 3–73) and remove tube assemblies (20) and hoses (21) from the boom.

(5) Attach a suitable sling and hoist to support the boom.

(6) Remove nuts (26), washers (27) and pins (28) attaching boom to front frame.

(7) Raise boom with hoist and remove from loader.

c. Installation.

(1) Move boom (32, fig. 3–73) into position with hoist and line up holes in boom with supports on front frame.

(2) Secure boom to frame with pins (28), washers (27), and nuts (26). Tighten nuts to a torque of 725 to 750 foot-pounds.

(3) Install hoses (21) and tubes (20) and secure with clamps (19).

(4) Refer to paragraph 3–94 and connect lift cylinders to boom.

(5) Refer to paragraph 3–97 and install the dump and cross links.

(6) Refer to paragraph 3–96 and install the bucket.

(7) Start engine and operate loader. Check operation. Check hoses and cylinders for leaks.

(8) Check hydraulic reservoir for proper oil level (para 3–92).

Section XIX. ELECTRICAL SYSTEM

3–99. General

a. General. The electrical system (fig. 1–3) of the loader is essentially used to supply power for starting the engine. It also supplies power for the lights, instruments, and warning devices incorporated on the loader.

b. Batteries. Two 12-volt batteries store power for the unit. The two batteries are connected in series to provide 24-volt output to operate the starter and other electrical equipment. A battery box and cover, mounted on the right hand side of the vehicle, protects the batteries.

c. Generator. The generator (alternator) is mounted on the left side of the engine and is driven by two V-belts. Alternating current produced by the alternator is rectified into direct current by six silicon diodes (semiconductors) in a full wave rectifier circuit which is built into the generator. A polarity protector installed in the circuit between the ammeter and the generator protects the diodes, from damage due to reversing the polarity of the system.

d. Voltage Regulator. The solid state sealed voltage regulator is mounted on a panel at the right front of the engine compartment. The voltage regulator controls the generator output by regulating current flow to the field of the

generator. Action of the regulator maintains the batteries at near full charge but prevents damage to the batteries through excessive charging.

e. Lighting System. Lights are provided for normal driving, for blackout driving, and for night operations through the use of floodlights. The lights are controlled by the light switch (8, fig. 2–3). The switch incorporates a locking feature to prevent accidental operation of the regular lighting system during blackout conditions. Stoplights (18, fig. 1–3) are actuated by a switch (9, fig. 1–3) mounted on the brake valve. The floodlights are controlled by two toggle switches (37 and 38, fig. 1–3) mounted on the control panel. Warning lights and buzzers are energized by transmitting switches mounted to be actuated by pressure (air) and heat (converter). Directional turn signal lights are controlled by a lever switch (29, fig. 1–3) mounted on the steering column.

f. Master Switch. A master switch (ignition switch) (36, fig. 1–3) controls the vehicle circuits. This switch must be on to operate the vehicle.

g. Circuit Breakers. Three circuit breakers (7, 12, and 32, fig. 1–3) are installed in the circuits. Circuit breaker (7) is a 25 amp breaker and protects the lighting system. Circuit breaker (12) is a 45 amp breaker and protects the starting motor circuit. Circuit breaker (32) is a 6 amp breaker and protects the main switch circuits.

h. Horn. The horn (30, fig. 1–3) is operated by air pressure and controlled by a horn button (31, fig. 1–3) which operates an electric air valve on the horn assembly.

i. Fuel Shutoff. The fuel shutoff (20, fig. 1–3) is mounted in the top of the fuel injection pump. When the master switch is turned on the solenoid opens the shutoff valve and allows fuel to flow to the injectors. Turning the master switch off closes the valve and stops the engine by cutting off the fuel supply.

3–100. Batteries and Battery Box

a. General. The batteries are mounted in a protective box on the right side of the loader. To gain access to the batteries, loosen the latch and open the hinged cover.

b. Service.

(1) *Specific gravity test.* The state of charge of each cell is determined by checking the specific gravity of the electrolyte (battery fluid). A corrected specific gravity reading of 1.285 in each cell indicates a fully charged battery. A reading of 1.225 or less in each cell indicates that the battery must be recharged or replaced.

(2) *Adding water.* The water in the electrolyte solution will evaporate at high temperature or with excessive charging rates. Check the electrolyte level and add distilled water, or clean water, when necessary to bring the electrolyte the three-fourths of an inch above the separators.

(3) *Cleaning.* The tops of the batteries must be kept clean. Tighten vent plugs and clean batteries with a brush dipped in ammonia or a solution of bicarbonate of soda and water. After foaming stops, flush top of batteries with clean water. If terminals and cable clamps are corroded, disconnect cables and clean with the same solution. Connect cables to battery. Waterproof battery terminals by packing with heavy asbestos grease (GK).

***Warning:* When removing battery cables, disconnect ground cable first. When connecting battery cables connect the ground cable last. Accidental contact of a cable replacing tool with the loader causes a direct short resulting in instant heating of the tool to red heat. This can cause painful burns on hands and serious damage to tools, loader, and batteries. A shorted battery may explode and spray hot acid over the surrounding area.**

c. Removal.

(1) Place master switch (fig. 2–3) in the off position.

(2) Refer to figure 3–74 and remove the batteries and battery box.

d. Installation. Refer to figure 3–74 and install batteries and box. Refer to *a* above and service batteries, if necessary.

3–101. Generator

a. General. The generator is mounted on the left side of the engine and is driven by two belts from the crankshaft pulley.

***Warning:* Before servicing any part of the**

electrical system, make certain that the master switch is in the off position and disconnect battery ground cable.

b. Removal.

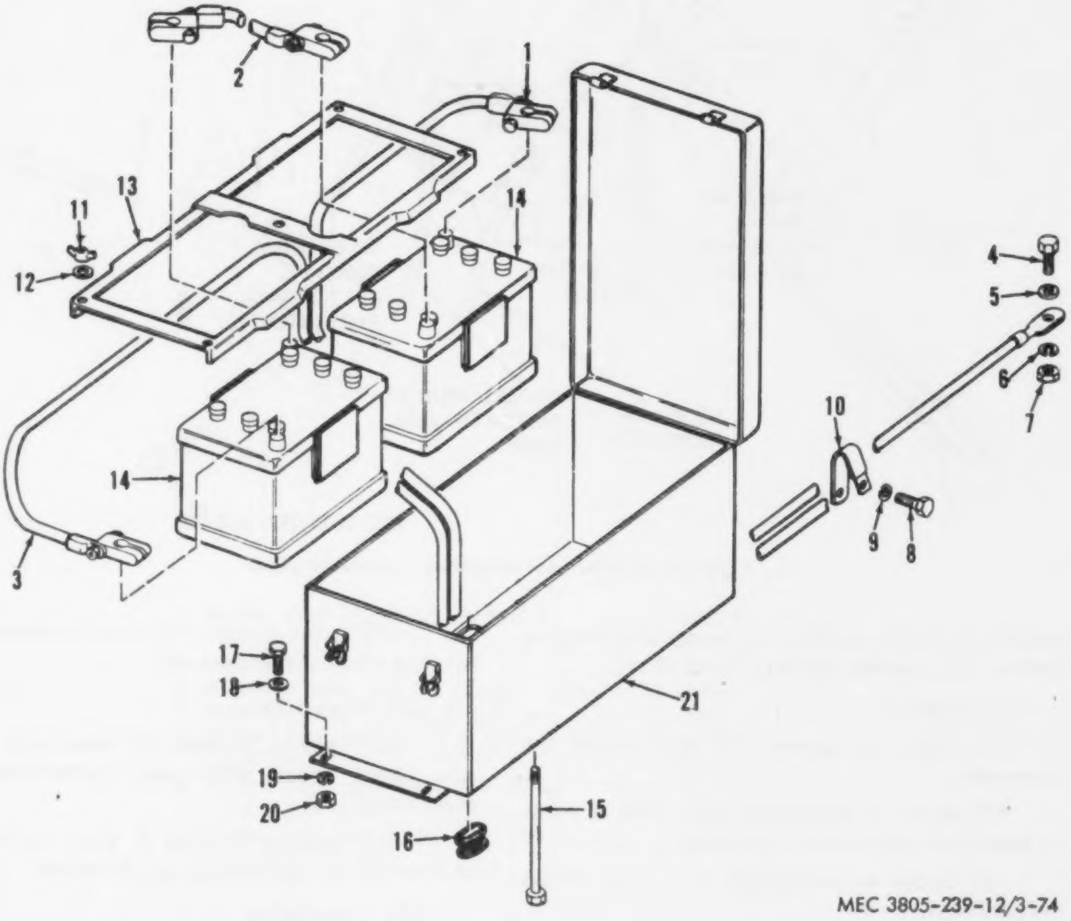
(1) Disconnect wires from rear of generator. Refer to figure 3–75 for wire connections to the generator.

(2) Refer to figure 3–76 and remove the generator from the engine.

(3) Remove generator (14) from brace and mounting bracket.

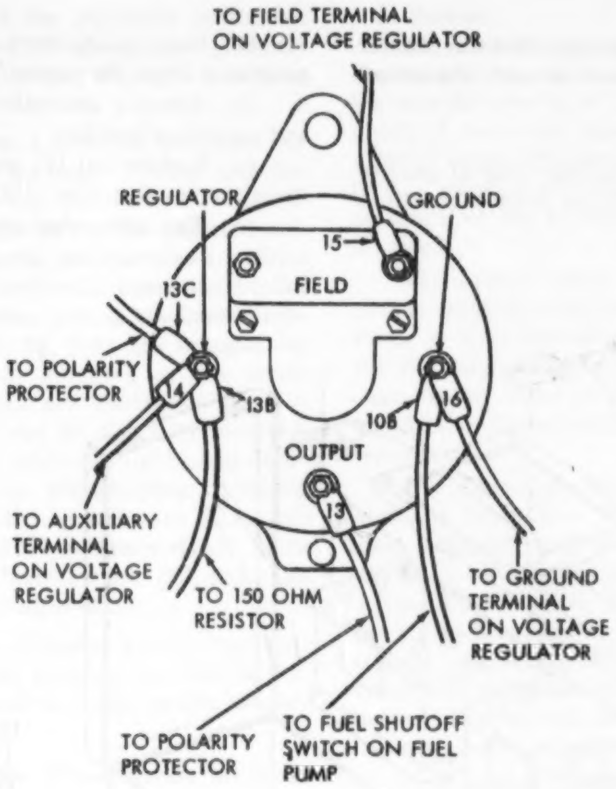
(4) Remove nut (9) and lock washer (10). Install pulley in a vise with soft jaws.

(5) Tap generator shaft sharply with a



1 Battery ground cable
2 Battery-to-ground cable
3 Power cable to solenoid
4 Screw, cap, hex-head, ½–13 x 1¾ in.
5 Washer flat, ½ in.
6 Washer, lock, ½ in.
7 Nut, ½–13
8 Screw, cap, hex-head, ½–13 x ¾ in.
9 Washer, lock, ½ in.
10 Clamp
11 Nut, wing (5 rqr)
12 Washer, flat, ⅜ in. (5)
13 Battery bracket
14 Battery, 12 volt (2)
15 Hold-down bolt (5)
16 Grommet
17 Screw, cap, hex-head, 5/16–18 x 1½ in. (4)
18 Washer, flat, 5/16 in. (4)
19 Washer, lock, 5/16 in. (4)
20 Nut, 5/16–18 (4)
21 Battery box

Figure 3–74. Batteries and box, exploded view.



MEC 3805-239-12/3-75

Figure 3-75. Generator connections, schematic view.

mallet or plastic hammer to loosen and remove pulley, fan, spacer, and key from shaft.

c. *Installation.*

(1) Refer to figure 3-76 and install the generator.

(2) Refer to figure 3-76 and connect wires to generator and install capacitor.

(3) Refer to paragraph 3-11 and adjust belt tension.

d. *Brushes.*

(1) *Removal.*

(*a*) Refer to figure 3-75 and disconnect leads from generator.

(*b*) Refer to figure 3-77 and remove the brushes from the generator.

(2) *Inspection.*

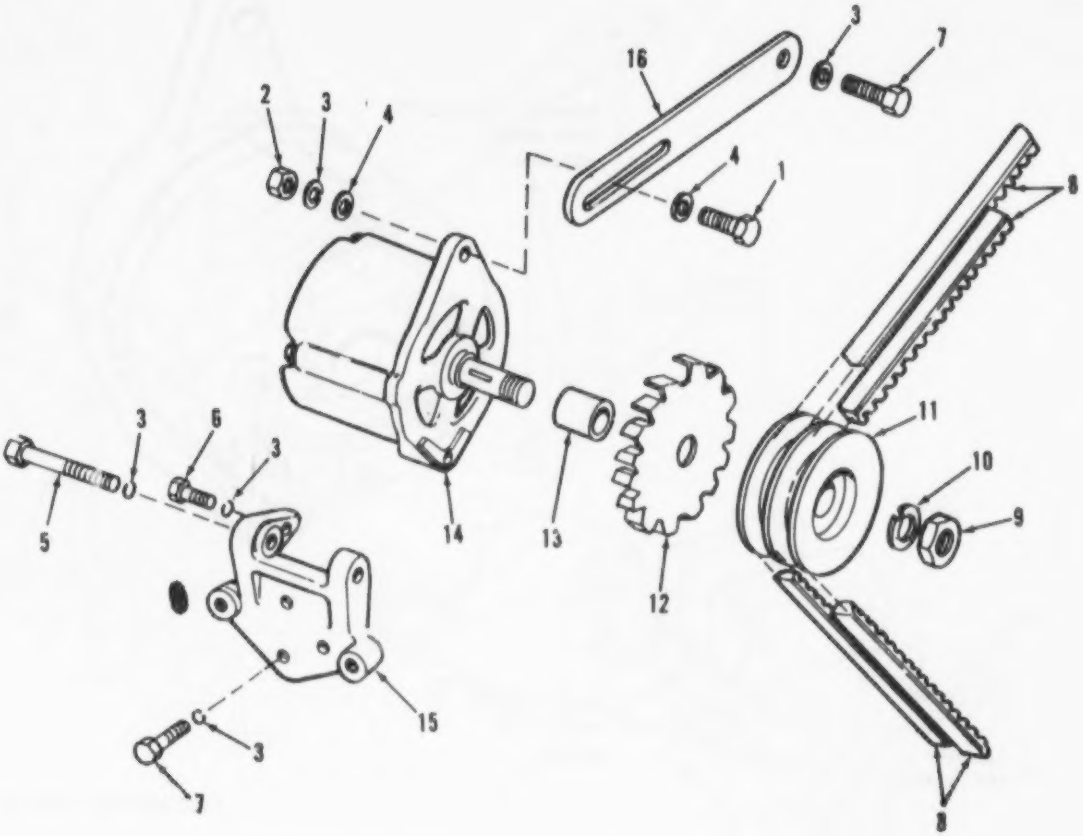
(*a*) Inspect brushes for wear and damage. Check brush wires and connections for good conditions.

(*b*) Replace brushes if worn, damaged, or if wires or connections are damaged.

(3) *Installation.*

(*a*) Refer to figure 3-77 and install brushes.

(*b*) Refer to figure 3-75 and connect wires to generator.



1 Screw, cap, hex-head, 3/8-16 x 1-1/8 in.
2 Nut, 3/8-16
3 Washer, lock, 3/8 in. (7 rqr)
4 Washer, flat, 3/8 in. (2 rqr)
5 Screw, cap, hex-head, 3/8-16 x 3-3/4 in.
6 Screw, cap, hex-head, 3/8-16 x 1-5/8 in.
7 Screw, cap, hex-head, 3/8-16 x 1-3/8 in. (4 rqr)
8 Belt (2 rqr)
9 Nut, 5/8-18
10 Washer, lock, 5/8 in.
11 Pulley
12 Fan
13 Spacer
14 Generator
15 Mounting bracket
16 Adjusting brace

MEC 3805-239-12/3-76

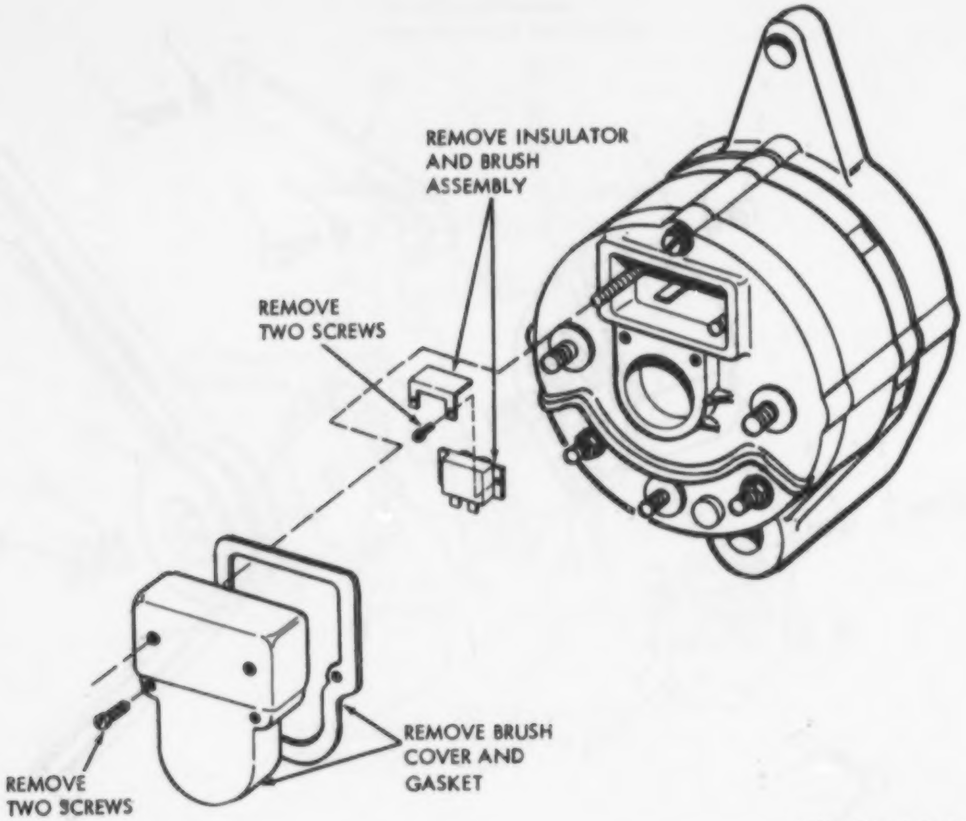
Figure 3-76. Generator, removal and installation.

3-102. Electrical Components

a. General. Some components of the electrical system are mounted on the underside of the platform assembly. They consist of the polarity protector, 45 amp circuit breaker, 150 ohm resistor, directional signal relay and terminal board, and the slave receptacle.

b. Removal.

(1) Tag wire leads connected to the termi-


REMOVE INSULATOR AND BRUSH ASSEMBLY
REMOVE TWO SCREWS
REMOVE BRUSH COVER AND GASKET
REMOVE TWO SCREWS

MEC 3805-239-12/3-77

Figure 3-77. Generator brushes, removal and installation.

nal boards on the relay and terminal board (16, fig. 3-78). Disconnect wires.

(2) Disconnect wire leads from resistor (6), polarity protector (25), and circuit breaker (12). Tag leads.

(3) Remove components.

c. *Installation.*

(1) Refer to figure 3-78 and install the components.

(2) Connect the wire leads to the various components. Check tags on wires before connecting.

3-103. Voltage Regulator

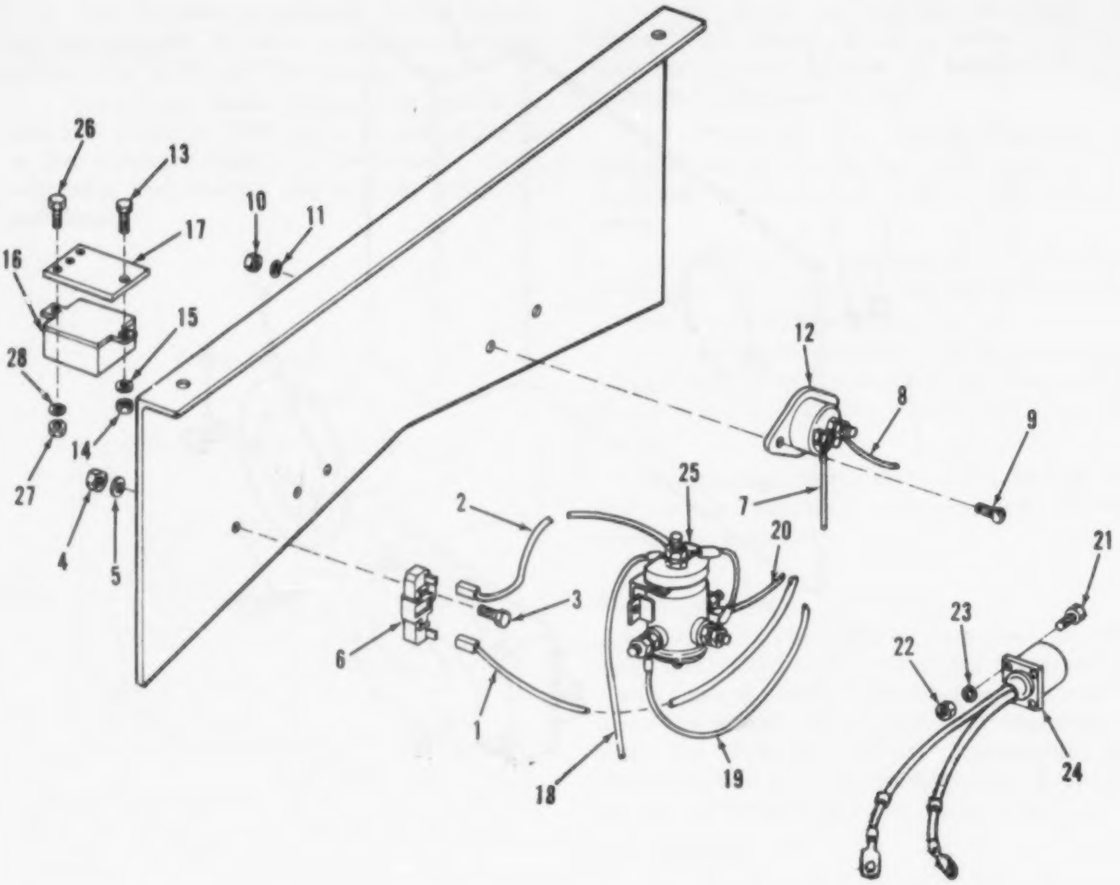
a. *General.* The sealed voltage regulator is mounted on a bracket attached to the radiator support at the left side of the vehicle. The hourmeter is also mounted on the bracket.

b. *Removal.*

(1) Disconnect wiring harness to voltage regulator.

(2) Disconnect two wires from rear of hourmeter.

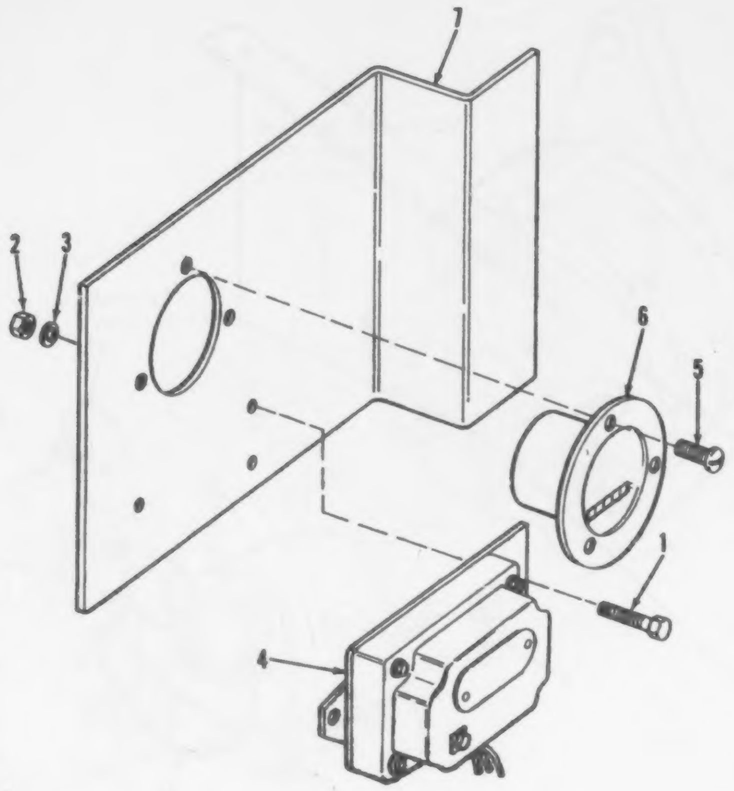
(3) Refer to figure 3-79 and remove voltage regulator and hourmeter.



1 Lead, to generator
2 Lead, to protector
3 Screw, cap, hex-head, 1/4-28 x 3/4 in. (2 rqr)
4 Nut, 1/4-28 (2 rqr)
5 Washer, lock, 1/4 in. (2 rqr)
6 150 ohm resistor
7 Lead, to starter
8 Lead, to ammeter
9 Screw, machine, No. 10-24 x 1 in. (2 rqr)
10 Nut, No. 10-24 (2 rqr)
11 Washer, lock, No. 10
12 45 amp circuit breaker
13 Screw, cap, hex-head, 1/4-20 x 1-3/4 in. (2 rqr)
14 Nut, 1/4-20 (2 rqr)
15 Washer, lock, 1/4 in. (2 rqr)
16 Relay and terminal board
17 Mounting plate
18 Lead, to oil pressure switch
19 Lead, to generator
20 Lead, to ammeter
21 Screw, cap, hex-head, 1/4-20 x 1-3/8 in. (4 rqr)
22 Nut, 1/4-20 (4 rqr)
23 Washer, lock, 1/4 in. (4 rqr)
24 Slave receptacle
25 Polarity protector
26 Screw, cap, hex-head, 3/8-16 x 1-3/4 in. (2 rqr)
27 Nut, 3/8-16 (2 rqr)
28 Washer, lock, 3/8 in. (2 rqr)

MEC 3805-239-12/3-78

Figure 3-78. Electrical components, exploded view.



1 Screw, cap, hex-head, 1/4-28 x 3/4 in. (3 rqr)
2 Nut, 1/4-28 (3 rqr)
3 Washer, lock , 1/4in. (3 rqr)
4 Voltage regulator
5 Screw, machine, No. 6 x 1/2 in. (3 rqr)
6 Hourmeter
7 Bracket (welded)

MEC 3805-239-12/3-79

Figure 3-79. Voltage regulator and hourmeter, removal and installation.

c. Adjustment. The voltage regulator has been adjusted to regulate at 28.4 volts at an ambient temperature of 75° F. The voltage can be adjusted as to provide slight raising and lowering of the voltage regulated.

(1) With voltage regulator removed, or dismounted, the voltage can be raised or lowered 0.6 volt by moving a strap (fig. 3-80) as illustrated.

(2) An adjustment screw is provided to allow a fine adjustment to the voltage regulator.

(*a*) Refer to figure 3-79 and install the voltage regulator and hourmeter.

(*b*) Connect a voltmeter to the battery and an ammeter in series with the alternator output (fig. 3-75) and the regulator.

(*c*) Start loader engine and operate at fast idle (1200 to 1500 rpm). Switch on lights so that ammeter reads 10 to 15 amperes. Check voltmeter and operate engine until voltmeter stabilizes.

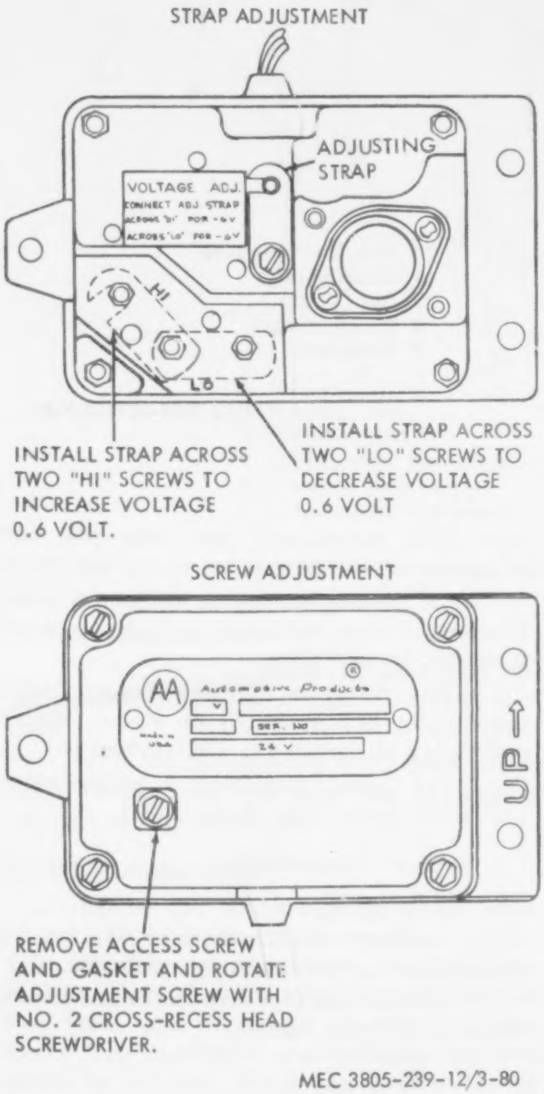

STRAP ADJUSTMENT
ADJUSTING STRAP
VOLTAGE ADJ.
CONNECT ADJ STRAP
ACROSS "HI" FOR +6V
ACROSS "LO" FOR -6V
HI
LO
INSTALL STRAP ACROSS TWO "HI" SCREWS TO INCREASE VOLTAGE 0.6 VOLT.
INSTALL STRAP ACROSS TWO "LO" SCREWS TO DECREASE VOLTAGE 0.6 VOLT
SCREW ADJUSTMENT
AA
Automotive Products
SER. NO
24 V
UP
REMOVE ACCESS SCREW AND GASKET AND ROTATE ADJUSTMENT SCREW WITH NO. 2 CROSS-RECESS HEAD SCREWDRIVER.
MEC 3805-239-12/3-80

Figure 3-80. Voltage regulator adjustment.

(*d*) Using screwdriver as noted on figure 3-80, rotate adjusting screw counterclockwise a few degrees to reduce voltage; clockwise to increase voltage.

***Warning:* The voltage regulator is charged electrically. Do not allow screwdriver to touch anything but voltage adjustment screw.**

(*e*) Stops are provided to limit rotation to one-half turn total. Do not try to force adjusting screw beyond stops.

(*f*) Observe voltmeter and set voltage to desired rate. Remove screwdriver and install access screw and gasket (fig. 3-80). Stop engine.

d. Installation. Refer to figure 3-79 and install voltage regulator and hourmeter if not previously installed.

3-104. Starter

a. General. The starter, mounted on the right side of the engine, is of the overrunning clutch type. A solenoid operated lever pivots to move the clutch drive gear into engagement with the flywheel. After engagement the switch portion of the solenoid closes the electrical circuit to the motor and causes rotation.

b. Removal.

(1) Turn master switch to off position and disconnect battery ground cable (para 3-100).

(2) Disconnect cables and wire leads from solenoid by removing nuts (7, fig. 3-81) and starter terminal nut (10).

(3) Remove screws (1) and washers (2) and starter (31) and adapter (4) from engine.

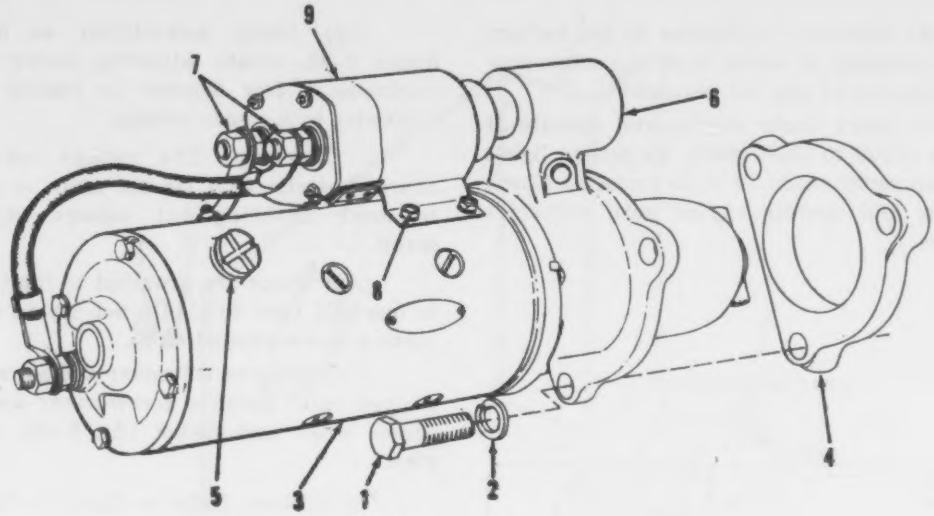
c. Installation.

(1) Refer to figure 3-81 and install the starter (3) and adapter (4) on the engine. Secure starter with screws (1) and washers (2).

(2) Connect cables and wire leads to starter under terminal nut (10) and starter solenoid nuts (7).

d. Brush Replacement.

(1) *Inspection.* Remove brush access plug (5, fig. 3-81) and inspect brushes for wear, cracks, and damage. Check brush leads for secure connections.



1 Screw, cap, hex-head, 5/8-11 x 2-1/4 in. (3 rqr)	5 Brush access plug
2 Washer, lock, 5/8 in. (3 rqr)	6 Housing plug
3 Starter	7 Nut (2 rqr)
4 Starter adapter	8 Screw (4 rqr)
	9 Solenoid

MEC 3805-239-12/3-81

Figure 3-81.

(2) *Removal.*

(*a*) Remove brush access plug (5) fig. 3-81 and disconnect field winding leads from brush holder.

(*b*) Refer to figure 3-82 and remove screws (4) and washers (5) and remove commutator end plate (6) from starter. Remove and discard preformed packing (7).

(*c*) Remove eight screws (8) and washer (9) and remove eight brushes (10) from brush holder.

(3) *Installation.*

(*a*) Refer to figure 3-82 and install brushes (10) in brush holders. Secure with screws (8) and washers (9).

(*b*) Cover commutator in starter frame with fine sandpaper and hold in place with tape. Slide commutator end plate (6), with brushes around commutator, on starter frame.

(*c*) Rotate brushes on sandpaper to seat brushes. Remove sandpaper and clean commutator and brush holder.

(*d*) Refer to figure 3-82 and install commutator end plate (6) on starter. Secure end plate with screws (4) and washers (5).

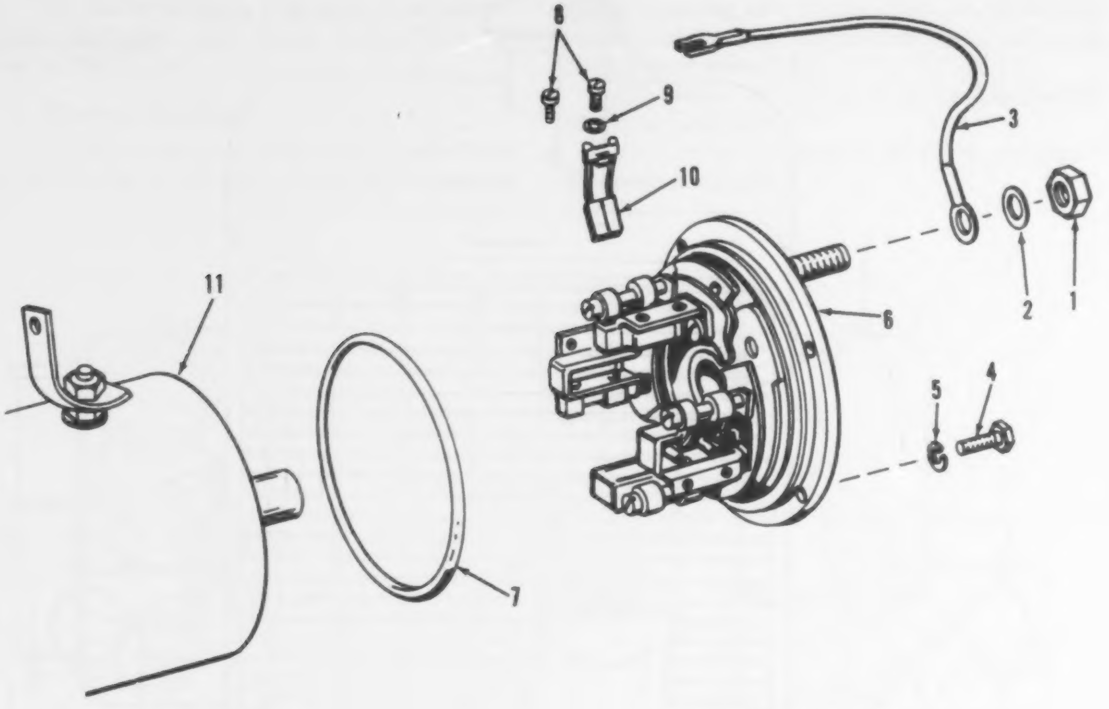
(*e*) Connect field leads to brush holders and install access plug (5, fig. 3-81).

e. Solenoid Replacement.

(1) *Removal.*

(*a*) Remove nuts (7, fig. 3-81) and disconnect lead and connector from solenoid.

(*b*) Remove four screws (8) and remove solenoid (9) from starter.



1 Nut	7 Preformed packing
2 Washer, lock	8 Screw, machine (8 rqr)
3 Solenoid lead	9 Washer (4 rqr)
4 Screw, cap, hex-head (4 rqr)	10 Brush (8 rqr)
5 Washer, lock (4 rqr)	11 Starter frame
6 Commutator end plate	

MEC 3805-239-12/3-82

Figure 3–82. Starter brushes, removal and installation.

(2) *Installation.*

(1) Install solenoid (9) on starter. Do not damage rubber boot when installing solenoid.

(2) Secure solenoid with four screws (8). Connect connector and lead to solenoid and secure with two nuts (7).

3–105. Loader Lights

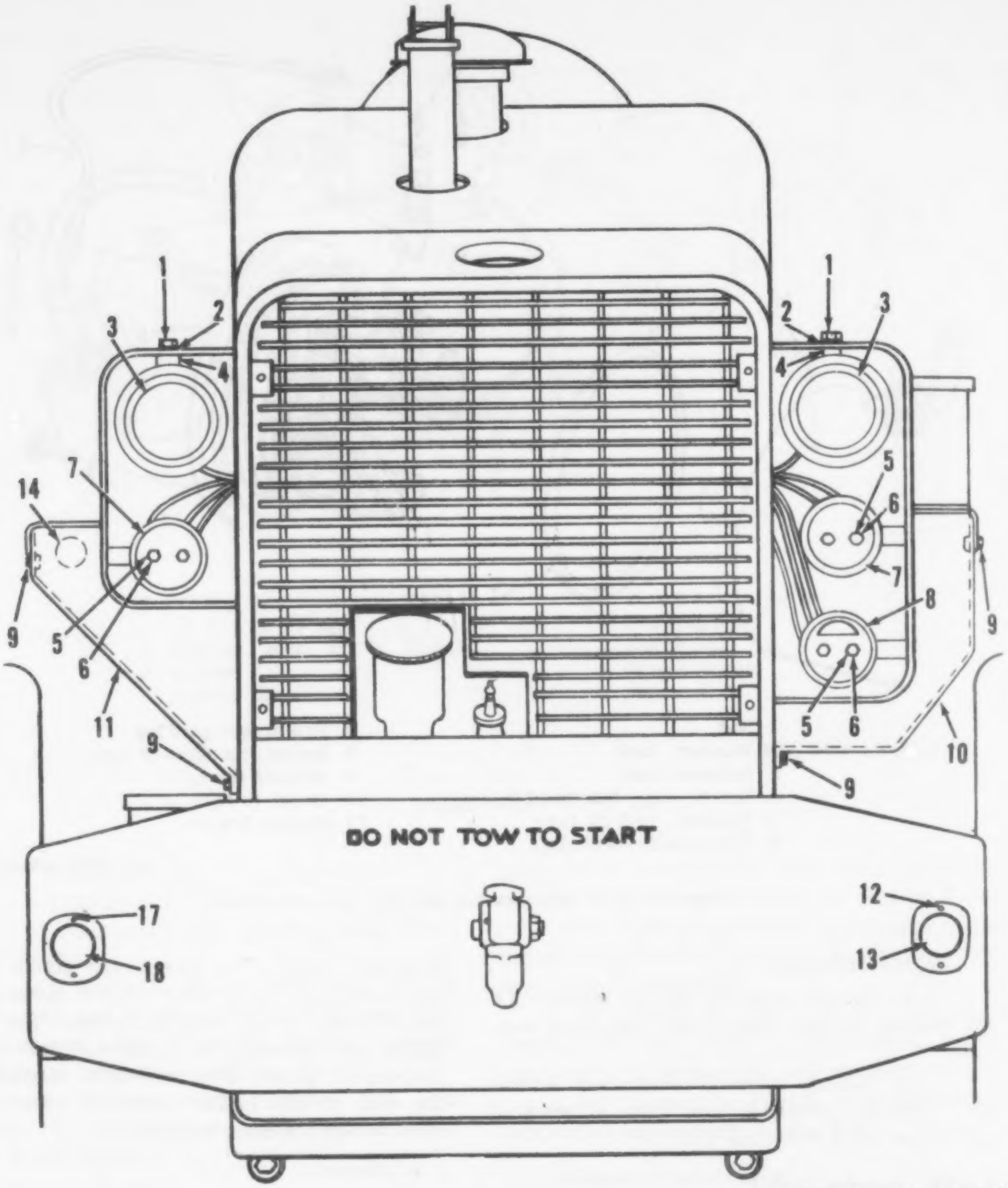
a. General. The loader lighting system consists of a set of driving lights including a headlight, blackout headlight, stop and taillights, flasher lights, blackout stop and taillight, and two front and two rear directional signal lights. The headlights and taillights are controlled by the light switch (fig. 2–3) on the instrument panel. The directional signal lights are controlled by a lever switch mounted on the left side of the steering column. The floodlights are controlled by toggle switches on the instrument panel. Two reflectors, mounted on the rear of the loader, serve as warning devices to approaching vehicles.

b. Removal.

(1) Turn master switch to off position and disconnect battery ground cable.

(2) Disconnect wires from rear of lights before attempting to remove lights.

(3) Refer to figure 3–83 and remove the headlights, signal lights, and floodlights from the front of the loader.



MEC 3805-239-12/3-83

1	Nut, ⅝-18 (2)
2	Washer, lock, ⅝ in. (2)
3	Floodlight (2)
4	Spacer (2)
5	Screw, cap, hex-head, ⅜-16 x ¾ in. (6)
6	Washer, lock, ⅜ in. (6)
7	Tail, stop, and signal light (2)
8	Blackout taillight
9	Screw, self-tapping (12)
10	Guard
11	Guard
12	Screw self-tapping
13	Reflector (2)
14	Grommet

Figure 3-83. Rear lights, removal and installation.

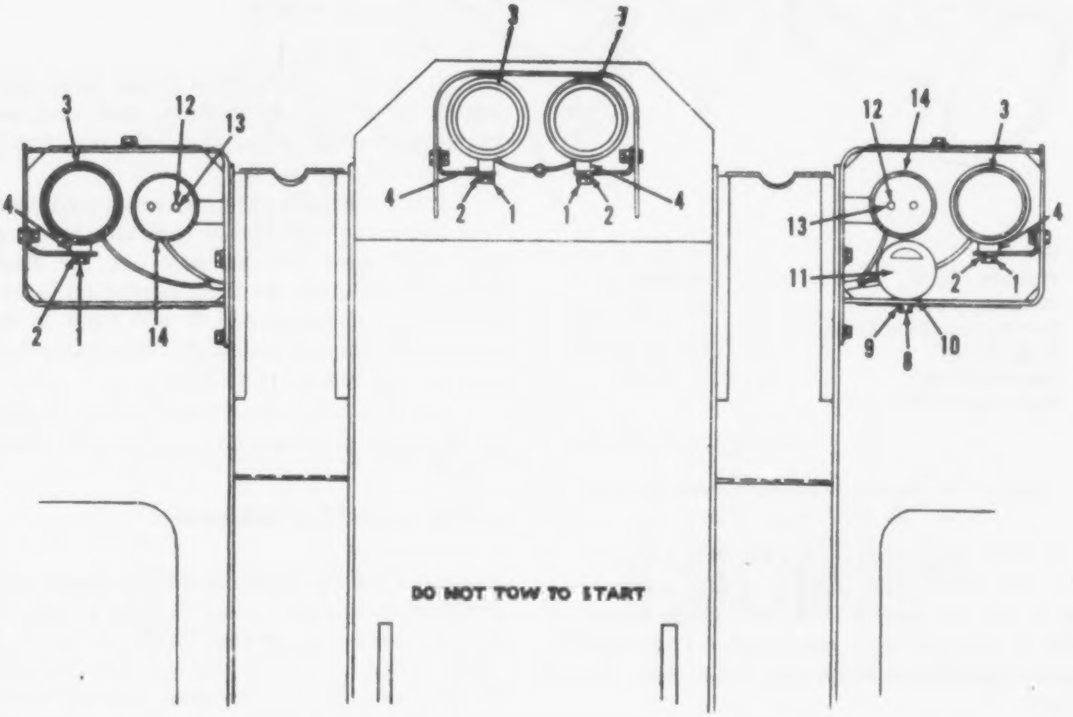
(4) Refer to figure 3–84 and remove floodlights, taillights, and signal lights from the rear of the loader.

c. Blackout Headlight.

(1) To replace the lamp unit, loosen three screws (4, fig. 3–85) and remove door assembly (7) and spring (6). Remove lamp unit (8) and disconnect wiring. Install new lamp unit and install door assembly.

(2) Refer to figure 3–85 to disassemble blackout headlight.

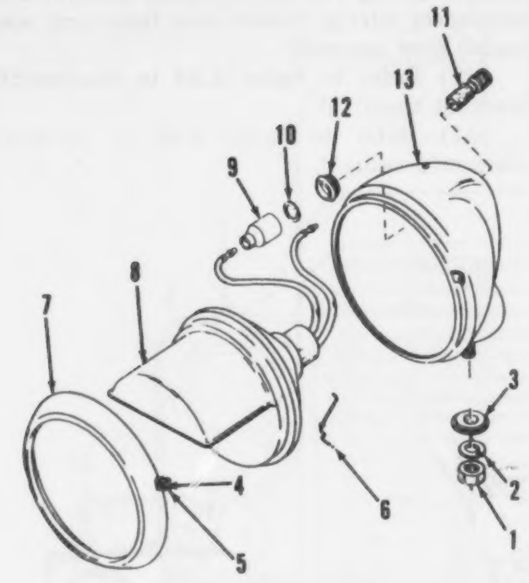
(3) Refer to figure 3–85 to assemble blackout headlight.



MEC 3805-239-12/3-84

1	Nut, 5/16–18 (2)
2	Washer, lock, 5/16 in. (2)
3	Floodlight (3)
4	Spacer (4)
5	Nut, 5/16–18
6	Washer, lock, 5/16 in.
7	Headlight
8	Nut
9	Washer, lock
10	Washer, bearing
11	Blackout headlight
12	Screw, cap, hex-head, ⅜–16 ¾ in. (4)
13	Washer, lock, ⅜ in. (4)
14	Signal and parking light (2)

Figure 3–84. Front lights, removal and installation.



1 Nut
2 Washer, lock
3 Bearing washer
4 Screw, machine (3 rqr)
5 Ring (3 rqr)
6 Spring (3 rqr)
7 Door assembly
8 Lamp unit
9 Shell
10 C-washer
11 Connector
12 Grommet
13 Body

MEC 3805-239-12/3-85

Figure 3-85. Blackout headlight, exploded view.

d. Tail, Stop, Signal, and Parking Light.

(1) To replace lamps, loosen screws (4) fig. 3-86 and remove lens (5). Press lamps (7 and 8) inward, turn one-quarter turn and remove. Install new bulbs and install lens. Install ring.

(2) Disassemble the tail, stop, and turn signal light.

Note: The lights are identical and quantities shown are for one light only.

(3) Refer to figure 3-86 and assemble the tail, stop, and turn signal light.

e. Blackout Tail and Stop Light.

(1) To replace lamps, loosen six screws (1, fig. 3-87) and remove door (3). Press lamps (5) inward and turn one-quarter turn to remove. Install new lamps and install door.

(2) Refer to figure 3-87 and disassemble blackout tail and stop light.

(3) Refer to figure 3-87 and assemble blackout tail and stop light.

f. Floodlights and Headlight

(1) To replace a sealed beam lamp unit (2, fig. 3-88) remove rubber retainer (1), disconnect lamp unit and remove. Install new lamp unit and secure with rubber retainer.

(2) Refer to figure 3-88 and disassemble the floodlight or headlight.

Note. Headlights and floodlights are identical, except for the sealed beam lamp unit.

(3) Refer to figure 3-88 and assemble the floodlight or headlight.

g. Flasher lights

(1) Refer to figure 2-3 ② and move unlock switch up to unlock position, hold and move the upper switch to the stop light position. Release unlock switch.

(2) To the left of the steering column and just below the turn signal indicator lever, pull the small lever all the way out for flasher lights. A red indicator light located on the turn signal switch, figure 2-3 ③ will start to flash on and off. This indicated that the amber lights and red tail lights are flashing.

(3) Move the directional control lever up or down to automatically release the flasher switch.

3-106. Auxiliary Solenoid

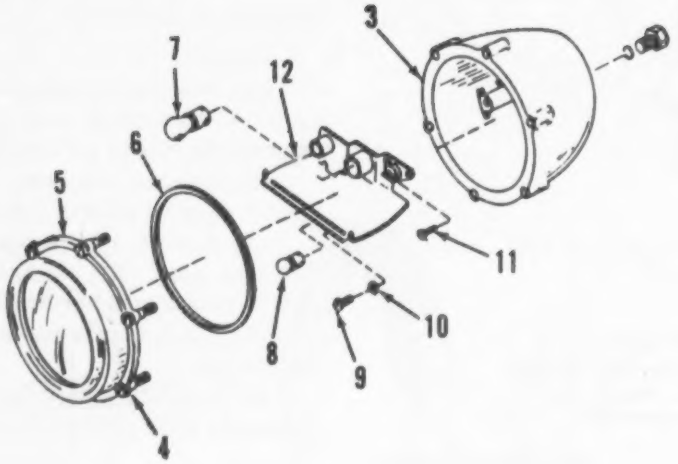
a. General.

A small solenoid, mounted on the engine above the starter, acts as a relay to close a high voltage circuit to the starter solenoid. When the main switch is on and neutral start switch on transmission linkage is closed current flows to the auxiliary solenoid and actuates the plunger. The plunger movement closes the points and permits the heavy current to flow to the starter. When the neutral start switch is opened, the solenoid opens the circuit to the starter.

b. Removal.

(1) Place the main switch in the off position and disconnect battery ground cable.

(2) Refer to figure 3-89 and remove the auxiliary solenoid.



1 Screw, cap, hex-head, 5/16-18 x 3/4 in. (2 rqr)
2 Washer, lock, 5/16 in. (2 rqr)
3 Body
4 Screw, w/ring (6 rqr)
5 Lens
6 Gasket
7 Lamp
8 Lamp (2 rqr)
9 Screw, machine (2 rqr)
10 Washer, lock (2 rqr)
11 Screw, machine (2 rqr)
12 Socket assembly

MEC 3805-239-12/3-86

Figure 3–88. Tail, stop, signal and parking, exploded view.

c. Installation.

(1) Refer to figure 3–89 and install the auxiliary solenoid.

(2) Connect battery ground cable and start engine.

(3) Check operation of starter and solenoid.

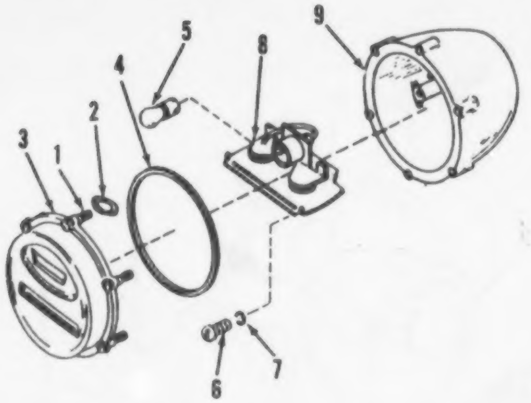
3–107. Horn

a. General. The horn, mounted below the platform, is air operated and electrically controlled. Depressing the horn button (fig. 2–3) actuates the horn solenoid and opens the air valve allowing air to enter the horn and sound a warning.

b. Removal.

(1) Place main switch in off position and disconnect battery ground cable.

(2) Open valve on air reservoir to drain air pressure.



1	Screw, machine (6 rqr)
2	Ring (6 rqr)
3	Door
4	Gasket
5	Lamp (2 rqr)
6	Screw, machine (2 rqr)
7	Washer, lock (2 rqr)
8	Socket assembly
9	Body

MEC 3805-239-12/3-87

Figure 3-87. Blackout stop and taillight, exploded view.

(3) Refer to figure 3-90 and remove the horn.

c. Installation.

(1) Refer to figure 3-90 and install the horn.

(2) Connect battery ground cable and start engine. Allow air pressure to build up.

(3) Depress horn button and check horn operation.

3-108. Instrument Panel

a. General. The instrument panel mounts the gages and switches required for operation of the loader. Gages, Switches, and instrument operation are explained in paragraph 2-14 and illustrated on figure 2-3.

b. Removal.

(1) Disconnect battery ground cable (1) fig. 3-74. Open drain cocks (1) fig. 3-48 on air reservoir to relieve air pressure.

(2) Remove two nuts (66) fig. 3-91 and remove steering column U-bolt (65).

(3) Remove four screws (1) and lift instrument panel (64) up and away from front cowl to gain access to rear of panel.

(4) Disconnect wires and tubes leading to instruments.

(5) Refer to figure 3-91 and remove instruments and switches from panel.

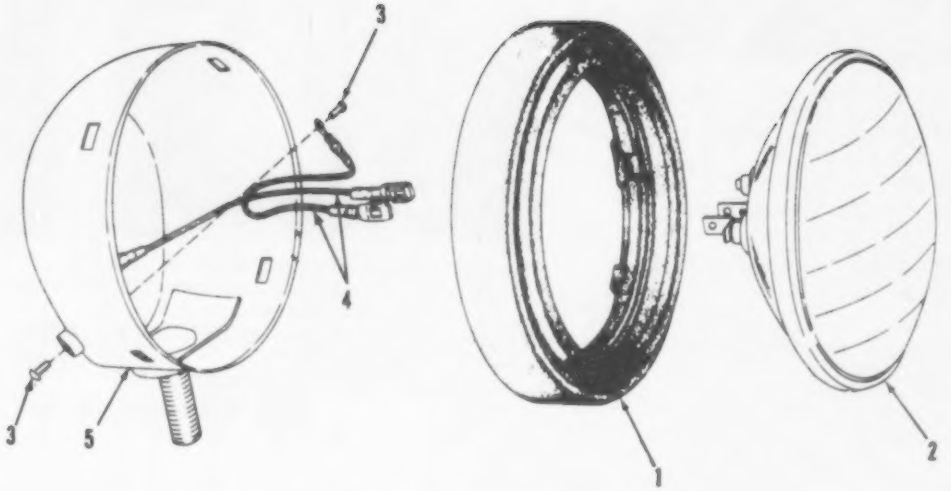
c. Installation.

(1) Refer to figure 3-91 and install instruments and switches on panel.

(2) Connect tubes and wires to instruments and switches.

(3) Install panel on cowl and secure with four screws.

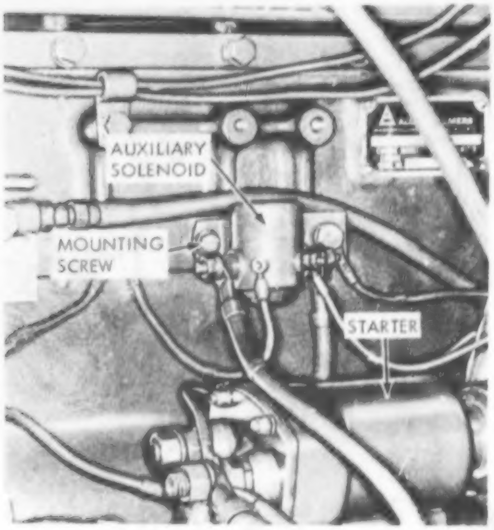
(4) Install U-bolt (65) on steering column and panel and secure with two nuts, (66) lockwashers (67) and flat washer (68).



1 Rubber retainer
2 Sealed beam lamp unit
3 Screw, machine, No. 8 x 5/16 in. (2 rqr)
4 Wire lead (2 rqr)
5 Body

MEC 3805-239-12/3-88

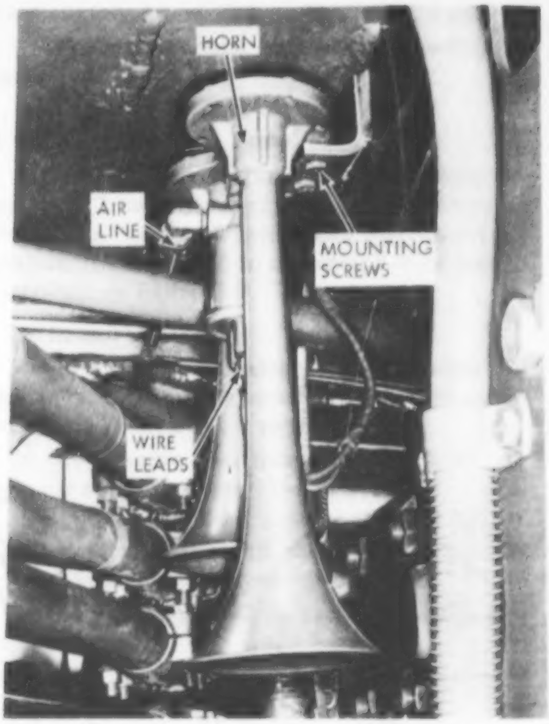
Figure 3-88. Headlight and floodlight, exploded view.



STEP 1. DISCONNECT ALL WIRE LEADS FROM AUXILIARY SOLENOID TERMINALS.
STEP 2. REMOVE TWO MOUNTING SCREWS AND WASHERS.
STEP 3. REMOVE AUXILIARY SOLENOID.

MEC 3805-239-12/3-89

Figure 3-89. Auxiliary solenoid, removal and installation.



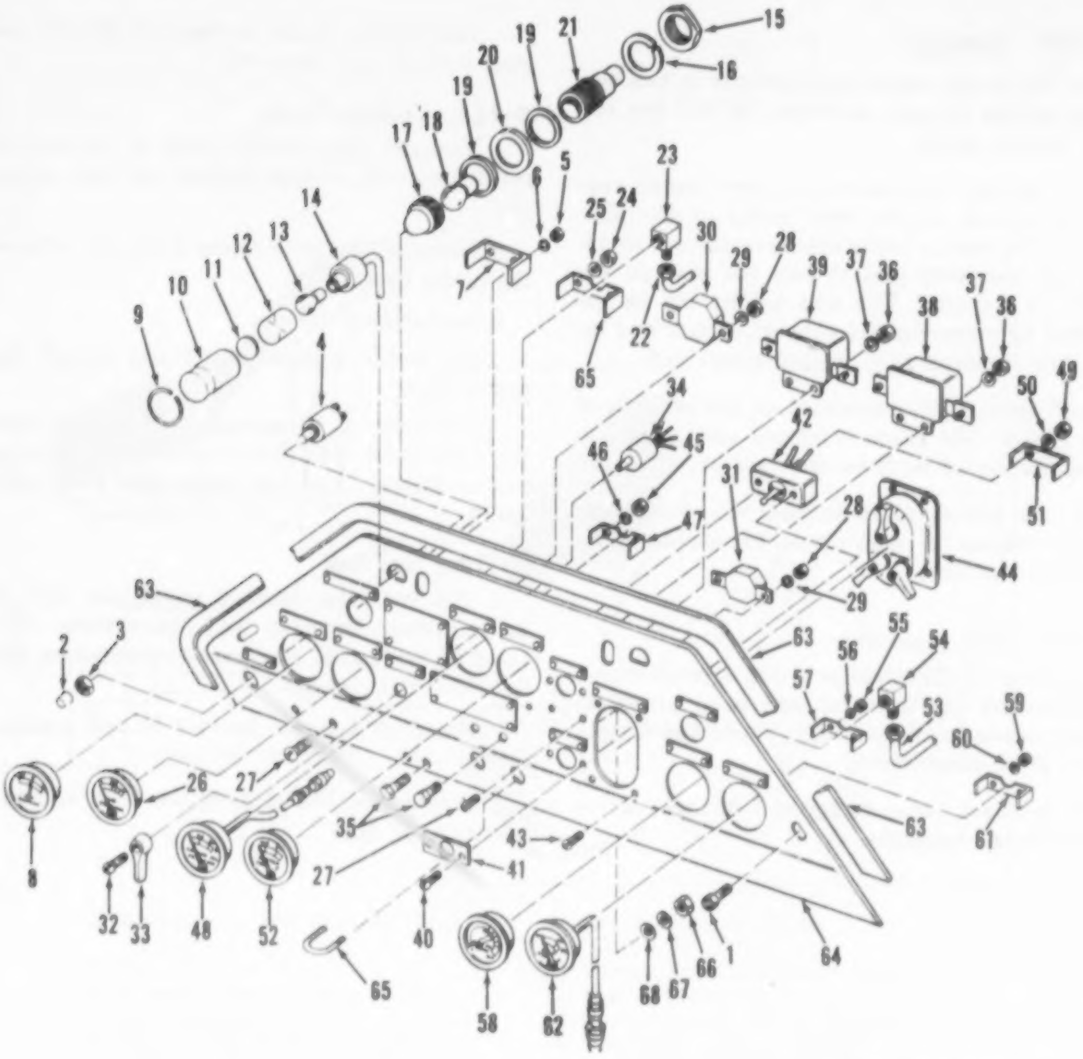
STEP 1. DISCONNECT WIRE LEADS FROM VALVE.
STEP 2. DISCONNECT AIR LINE FROM ELBOW AND REMOVE ELBOW.
STEP 3. REMOVE TWO MOUNTING SCREWS, NUTS, AND WASHERS.
STEP 4. REMOVE HORN FROM BRACKET.

MEC 3805-239-12/3-90

Figure 3-90. Horn, removal and installation.

Figure 3-91—Continued.

1	Screw, self-tapping, ⅜-16 x ⅜ in. (4)
2	Rubber cover
3	Nut
4	Horn switch
5	Nut (2)
6	Washer, lock (2)
7	Bracket
8	Ammeter
9	Ring (2)
10	Shield (2)
11	Gasket (2)
12	Lens (2)
13	Lamp (2)
14	Panel light socket (2)
15	Nut, 1-27 (2)
16	Washer, lock (2)
17	Warning light lens (2)
18	Lamp (2)
19	Gasket (2)
20	Flange (2)
21	Warning light socket (2)
22	Tube, reservoir to gage
23	Elbow
24	Nut (2)
25	Washer (2)
26	Air pressure gage
27	Screw, machine, No. 8-32 x ⅜ in. (4)
28	Nut, No. 8-32 (4)
29	Washer, lock, No. 8 (4)
30	Circuit breaker (6 amp)
31	Circuit breaker (25 amp)
32	Screw
33	Switch lever
34	Master switch
35	Screw, cap, hex-head, ¼-20 x ⅜ in. (4)
36	Nut, ¼-20 (4)
37	Washer, lock, ¼ in. (4)
38	Air pressure warning buzzer



MEC 3805-239-12/3-91

39	Transmission oil temperature warning buzzer	54	Elbow
40	Screw, machine, No. 8-32 x ½ in. (4)	55	Nut (2)
41	Instruction plate (2)	56	Washer, lock (2)
42	Floodlight switch (2)	57	Bracket
43	Screw, machine, No. 10 x ⅝ in. (4)	58	Transmission oil pressure gage
44	Loader light switch	59	Nut (2)
45	Nut (2)	60	Washer, lock (2)
46	Washer, lock (2)	61	Bracket
47	Bracket	62	Converter oil temperature gage
48	Engine oil pressure gage	63	Panel trim
49	Nut (2)	64	Instrument panel
50	Washer, lock (2)	65	U-Bolt
51	Bracket	66	Nut (2)
52	Engine coolant temperature gage	67	Washer, lock (2)
53	Tube, transmission to gage	68	Washer, plain

Figure 3-91. Instrument panel, exploded view.

Section XX. FRAME COMPONENTS

3-109. General

a. The frame components covered in this section include the seat assembly, the tool box and the towing pintle.

b. The seat is mounted on two angled supports secured to the floor plates of the platform. The seat is adjustable fore and aft by releasing the lever and sliding the seat on the rails as required. The seat height can be adjusted by removing the support screws and installing the support in the holes provided.

c. The tool box is mounted on the left side of the loader. The cover is hinged and latched to keep the tools free from the weather.

d. The towing pintle is mounted on the rear of the frame. To open pintle, release the latch and lift the hook.

3-110. Seat Assembly

a. General. The seat provides a comfortable position for the operator and is so placed to allow access to all operating levers and a clear view of all instruments.

b. Removal. Refer to figure 3-92 and remove the seat and supports.

c. Installation. Refer to figure 3-92 and install the seat and supports.

3-111. Towing Pintle

a. General. The towing pintle is secured to the frame with a large slotted nut and cotter pin.

b. Removal. Refer to figure 3-93 and remove the pintle hook.

c. Installation.

(1) Refer to figure 3-93 and install the pintle hook.

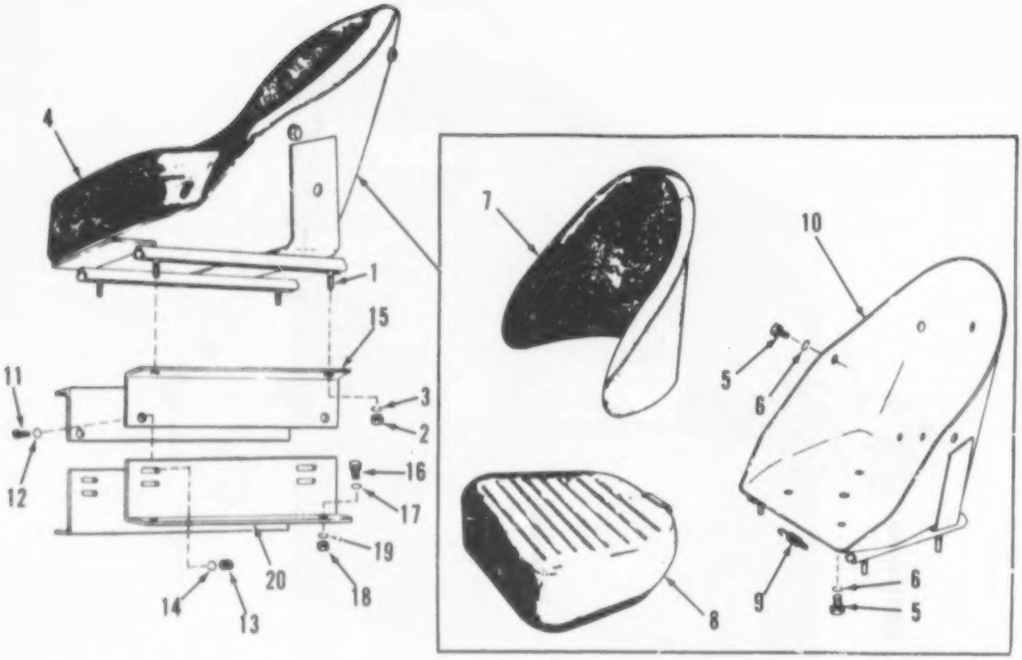
(2) Refer to paragraph 3-4 and lubricate the pintle hook with GAA (grease, automotive and artillery). Lubricate pintle hook every 250 hours.

3-112. Tool Box

a. General. The covered metal tool box is used to store the tools and spare parts allocated to the loader. The box is mounted on the left side of the loader.

b. Removal. Refer to figure 3-94 and remove the tool box.

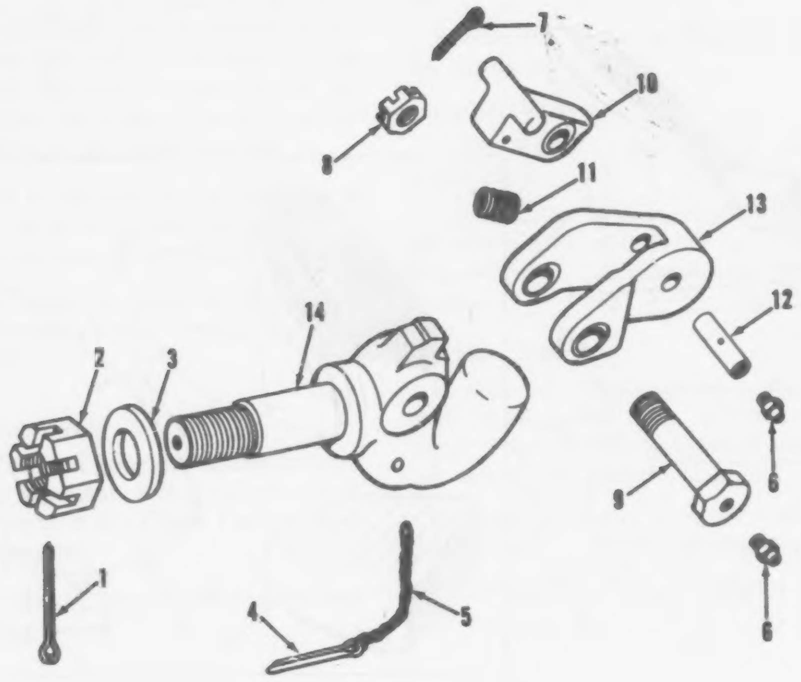
c. Installation. Refer to figure 3-94 and install the tool box.



1 Screw, cap, hex-head, 5/16-24 x 5/8 in. (4 rqr)
2 Nut, 5/16-24 (4 rqr)
3 Washer, lock, 5/16 in. (4 rqr)
4 Seat assembly
5 Screw, cap, hex-head, 3/8-16 x 5/8 in. (7 rqr)
6 Washer, lock, 3/8 in. (7 rqr)
7 Back rest
8 Seat cushion
9 Lever return spring
10 Shell
11 Screw, cap, hex-head, 3/8-24 x 1-1/4 in. (4 rqr)
12 Washer, flat, 3/8 in. (4 rqr)
13 Nut, 3/8-24 (4 rqr)
14 Washer, lock, 3/8 in. (4 rqr)
15 Seat upper support (2 rqr)
16 Screw, cap, hex-head, 1/2-13 x 1-1/2 in. (4 rqr)
17 Washer, flat, 1/2 in. (4 rqr)
18 Nut, 1/2-13 (4 rqr)
19 Washer, lock, 1/2 in. (4 rqr)
20 Seat lower support (2 rqr)

MEC 3805-239-12/3-92

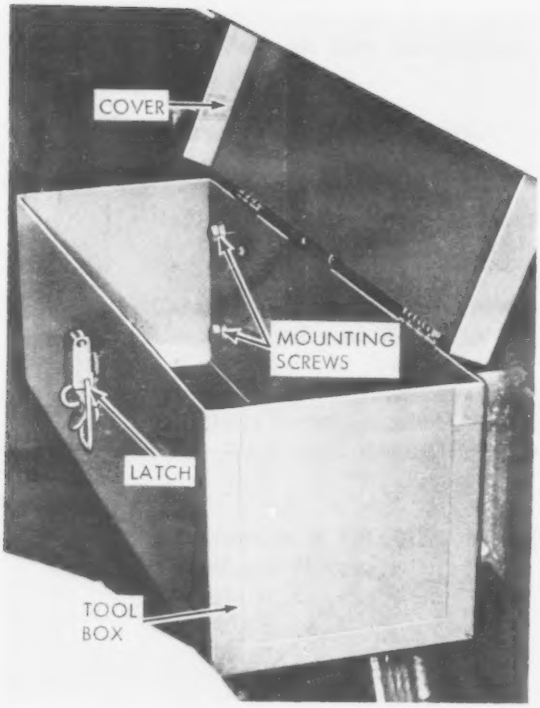
Figure 3-92. Seat assembly, removal and installation.



1 Pin, cotter, 1/4 x 3 in.
2 Nut, slotted, 1-1/2-12
3 Washer, flat (2 rqr)
4 Pin, cotter, 1/4 x 3-1/2 in.
5 Chain
6 Lubricating fitting (2 rqr)
7 Pin, cotter, 1/8 x 2 in.
8 Nut, slotted, 1-14
9 Bolt, 1-14 x 3-7/8 in.
10 Latch
11 Spring
12 Pin
13 Lock
14 Pintle

MEC 3805-239-12/3-93

Figure 3-93. Pintle hook, exploded view.



STEP 1. RELEASE LATCH AND OPEN COVER. REMOVE TOOLS AND SPARE PARTS.
STEP 2. REMOVE FOUR MOUNTING SCREWS, NUTS, AND WASHERS.
STEP 3. REMOVE TOOL BOX.

MEC 3805-239-12/3-94

Figure 3-94. Tool box, removal and installation.

APPENDIX A

REFERENCES

A–1. Lubrication

C9100IL	Fuels, Lubricants, Oils and Waxes
LO 5–3805–239–12	Lubrication Orders

A–2. Fire Protection

TB 5–4200–200–10	Hand Portable Fire Extinguishers for Army Users

A–3. Painting

TM 9–213	Painting Instructions for Field Use

A–4. Radio Suppression

TM 11–433	Radio Interference Suppression

A–5. Maintenance

TM 9–1870–1	Care and Maintenance of Pneumatic Tires
TB Ord 651	Use of Antifreeze Solutions and Cleaning Compounds in Engine Cooling Systems
TM 9–6140–200–15	Operator and Organizational, Field and Depot Maintenance Storage Batteries, Lead Acid Type
TM 38–750	Army Equipment Record Procedures

A–6. Shipment and Storage

TB 740–93–2	Preservation of USAMEC Mechanical Equipment for Shipment and Storage

APPENDIX B

BASIC ISSUE ITEMS LIST

Section I. INTRODUCTION

B–1. Scope

This appendix lists items which accompany the loader scoop or are required for installation, operation, or operator's maintenance.

B–2. General

This Basic Issue Items List is divided into the following sections:

a. Basic Issue Items—Section II. A list of items which accompany the loader, scoop or are required for the installation, operation, or operator's maintenance.

b. Maintenance and Operating Supplies—Section III. A listing of maintenance and operating supplies required for initial operation.

B–3. Explanation of Columns

The following provides an explanation of columns in the tabular list of Basic Issue Items, Section II.

a. Source, Maintenance, and Recoverability Codes (SMR), Column (1):

Note. Common hardware items known to be readily available in Army supply will be assigned maintenance codes only. Source Codes, Recoverability Codes, and Quantity Authorized will not be assigned to this category of items.

(1) Source Code, indicates the selection status and source for the listed item. Source codes are:

Code	*Explanation*
P	Applied to repair parts which are stocked in or supplied from GSA/DSA or Army supply system, and authorized for use at indicated maintenance categories.
M	Applied to repair parts which are not procured or stocked but are to be manufactured at indicated maintenance categories.
A	Applied to assemblies which are not procured or stocked as such, but made up of two or more units, each of which carry individual stock numbers and decriptions and are procured and stocked and can be assembled by units at indicated maintenance categories.
X	Applied to parts and assemblies which are not procured or stocked, the mortality of which is normally below that of the applicable end item, and the failure of which should result in retirement of the end item from the supply system.
X1	Applied to repair parts which are not procured or stocked, the requirement for which will be supplied by use of the next highest assembly or components.
X2	Applied to repair parts which are not stocked. The indicated maintenance category requiring such repair parts will attempt to obtain them through cannibalization; if not obtainable through cannibalization such repair parts will be requisitioned with supporting justification through normal supply channels.
C	Applied to repair parts authorized for local procurements. If not obtainable from local procurement, such repair parts will be requisitioned through normal supply channels with a supporting statement of nonavailability from local procurement.
G	Applied to major assemblies that are procured with PEMA (Procurement Equipment Missile Army) funds for initial issue only to be used as exchange assemblies at DSU and GSU level or returned to depot supply level.

(2) Maintenance Code, indicates the lowest category of maintenance authorized to install the listed item. The maintenance level codes are:

Code	*Explanation*
C	Operator/Crew
O	Organizational maintenance

(3) Recoverability Code, indicates whether unserviceable items should be returned for recovery or salvage. Items not coded are expendable. Recoverability codes are:

Code	Explanation
R	Applied to repair parts and assemblies which are economically repairable at DSU and GSU activities and are normally furnished by supply on an exchange basis.
T	Applied to high dollar value recoverable repair parts which are subject to special handling and are issued on an exchange basis. Such repair parts are normally repaired or overhauled at depot maintenance activities.
U	Applied to repair parts specifically selected for salvage by reclamation units because of precious metal content, critical materials, high dollar value reusable casings and castings.

b. Federal Stock Number, Column (2). This column indicates the Federal stock number for the item.

c. Description, Column (3). This column indicates the Federal item name and any additional description of the item required. A part number or other reference number is followed by the applicable five-digit Federal supply code for manufacturers in parentheses. Repair parts quantities included in kits, sets, and assemblies are shown in front of the repair part name.

d. Unit of Issue, Column (4). This column indicates the unit used as a basis for issue, e.g., ea, pr, ft, yd, etc.

e. Quantity Incorporated in Unit Pack, Column (5). This column indicates the actual quantity contained in the unit pack.

f. Quantity Incorporated in Unit, Column (6). This column indicates the quantity of the item used in the functional group.

g. Quantity Furnished With Equipment, Column (7). This column indicates the quantity of an item furnished with the equipment.

h. Quantity Authorized, Column (8). This column indicates the quantity of an item authorized the operator/crew to have on hand or to obtain as required. As required items are indicated with an asterisk.

i. Illustration, Column (9). This column is divided as follows:

(1) *Figure number, column (9)(a).* Indicates the figure number of the illustration in which the item is shown.

(2) *Item number, column (9)(b).* Indicates the callout number used to reference the item in the illustration.

B–4. Explanation of Columns in the Tabular List of Maintenance and Operating Supplies—Section III

a. Component Application. This column identifies the component aplication of each maintenance or operating supply item.

b. Federal Stock Number. This column indicates the Federal stock number for the item and will be used for requisitioning purposes.

c. Description. This column indicates the item and brief description.

d. Quantity Required for Initial Operation. This column indicates the quantity of each maintenance or operating supply item required for initial operation of the equipment.

e. Quantity Required for 8 Hours Operation. This column indicates the estimated quantities required for an average eight hours of operation.

f. Notes. This column indicates informative notes keyed to data appearing in a preceding column.

B–5. Abbreviations

ea	each

Section II. BASIC ISSUE ITEMS LIST

(1) Source, maint, and recov code			(2) Federal stock No.	(3) Description	(4) Unit of issue	(5) Qty inc in unit pack	(6) Qty inc in unit	(7) Qty furn with equip	(8) Qty auth	(9) Illustration	
(A) S	(B) M	(C) R								(A) Fig No.	(B) Item No.
				Group 31—BASIC ISSUE ITEMS Manufacturer Installed							
				3100—BASIC ISSUE ITEMS Manufacturer or Depot Installed							
P	O	--	7510-889-3494	Binder, Loose Leaf: US Army Equipment Log	ea	--	1	--	1		
P	O	--	7520-559-9618	Case, Operation and Maintenance Manuals: Cotton Duck, Water Repellant, Mildew resistant, MIL B-11734B	ea	--	1	--	1		
P	O	--	4210-889-2221	Extinguisher, Fire; Dry, Hand Type, 2½ lb. Fed. Spec. O-E-95, Type III, Class 2, Walter Kidde, P/N 874195 or Equal.	ea	--	1	--	1		
				Manual: TM 5-3805-239-15	ea	--	1	--	1		
				Department of the Army Lubrication Order							
				GROUP 32—BASIC ISSUE ITEMS TROOP Installed							
				3200—BASIC ISSUE ITEMS Troop Installed or Authorized							
P	O	--	4910-922-6921	Kit, Repair: Tubeless tire	ea	--	1	--	1		

Section III. MAINTENANCE AND OPERATING SUPPLIES

Item	Component application	Federal stock No.	Description	Quantity required for initial operation	Quantity required for 8 hrs operation	Notes
1	0101 CRANKCASE (1)		LUBRICATING OIL: 5 gal pail as follows:			(1) Includes quantity to fill engine oil system, including oil filters. (2) See FS C9100-IL for additional data and requisitioning procedure. (3) See current LO for grade application and replenishment intervals. (4) Use DF-2 in temperatures above 32°F. Use DF-1 in temperatures from 32°F to 0°F. Use DF-A in temperatures from 0°F to -65°F. (5) Fuel consumption under normal load is 4.5 gal per hour of continuous operation. (6) Includes quantity to fill transmission oil system, including hoses and filter. (7) Includes quantity of brake fluid for both front and rear brake cylinders. (8) Front differential 27 qt; rear differential 20 qt; each planetary hub, 3 qt. (9) See Table 2-1 for quantities, ambient temperatures, specific gravity and replenishment procedures.
		9150-265-9435(2)	OE-30	24 qt.	(3)	
		9150-265-9428(2)	OE-10	24 qt.	(3)	
		9150-242-7603(2)	OES	24 qt.	(3)	
2	0306 FUEL TANK		FUEL OIL, DIESEL Bulk as follows:			
		9140-252-5294	DF-2(4)	59 gal	(5)	
		9140-286-5286	DF-1(4)	59 gal	(5)	
		9140-286-5283	DF-A(4)	59 gal	(5)	
3	0700 TRANSMISSION & TORQUE CONVERTER		LUBRICATING OIL: 5 gal pail as follows:			
		9150-265-9435(2)	OE-30	31 qt. (6)	(3)	
		9150-265-9428(2)	OE-10	31 qt. (6)	(3)	
		9150-242-7603(2)	OES	31 qt. (6)	(3)	
4	1100 AXLE DIFFERENTIAL & PLANETARIES		LUBRICATING OIL: 5 gal pail as follows:			
		9150-242-7603(2)	OES	59 qt (8)		
5	1204 BRAKE MASTER CYLINDERS		HYDRAULIC FLUID: 1 pt can as follows:			
		9150-190-0932	HBA	2 pt (7)	(3)	
6	1401 STEERING GEAR ASSY.		GREASE, AUTOMOTIVE AND ARTILLERY:			
		9150-190-0905	GAA	1½ lb	(3)	
7	1413 HYDRAULIC SYSTEM		LUBRICATING: OIL: 5 gal pail as follows:			
		9150-265-9435	OE-30	54 gal	(3)	
		9150-265-9428	OE-10	54 gal	(3)	
		9150-242-7603	OES	54 gal	(3)	
8	LUBRICATION FITTINGS		GREASE, AUTOMOTIVE AND ARTILLERY			
		9150-150-0905	GGA	2 shots w/ grease gun	5 shots w/ grease gun	
9	RADIATOR		WATER—ANTI FREEZE	42 qt (9)		

APPENDIX C

MAINTENANCE ALLOCATION CHART

Section I. INTRODUCTION

C-1. General

a. This section provides a general explanation of all maintenance and repair functions authorized at various maintenance levels.

b. Section II designates overall responsibility for the performance of maintenance functions on the identified end item or component. The implementation of the maintenance functions upon the end item or component will be consistent with the assigned maintenance functions.

c. Section III lists the special tools and test equipment required for each maintenance function as referenced from section II.

d. Section IV contains supplemental instructions, explanatory notes and/or illustrations required for a particular maintenance function.

C-2. Explanation of Columns in Section II

a. Group Number, Column (1). The functional group is a numerical group set up on a functional basis. The applicable functional grouping indexes (obtained from TB 750-93-1, Functional Grouping Codes) are listed on the MAC (Maintenance Allocation Chart) in the appropriate numerical sequence. These indexes are normally set up in accordance with their function and proximity to each other.

b. Functional Group, Column (2). This column contains a brief description of the components of each functional group.

c. Maintenance Functions, Column (3). This column lists the various maintenance functions (A through K) and indicates the lowest maintenance category authorized to perform these functions. The symbol designations for the various maintenance categories are as follows:

C—Operator or crew
O—Organizational maintenance
F—Direct support maintenance
H—General support maintenance
D—Depot maintenance

The maintenance functions are defined as follows:

A—Inspect. To determine serviceability of an item by comparing its physical, mechanical, and electrical characteristics with established standards.

B—Test. To verify serviceability and to detect electrical or mechanical failure by use of test equipment.

C—Service. To clean, to preserve, to charge, to paint, and to add fuel, lubricants, cooling agents, and air.

D—Adjust. To rectify to the extent necessary to bring into proper operating range.

E—Align. To adjust specified variable elements of an item to bring to optimum performance.

F—Calibrate. To determine the corrections to be made in the readings of instruments or test equipment used in precise measurement. Consists of the comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy, of the instrument being compared with the certified standard.

G—Install. To set up for use in an operational environment such as an emplacement, site, or vehicle.

H—Replace. To replace unserviceable items with serviceable assemblies, subassemblies, or parts.

I—Repair. To restore an item to serviceable condition. This includes, but is not limited to, inspection, cleaning, preserving, adjusting, replacing, welding, riveting, and strengthening.

J—Overhaul. Te restore an item to a completely serviceable condition as prescribed by maintenance serviceability standards using the Inspect and Repair Only as Necessary (IROAN) technique.

K.–**Rebuild.** To restore an item to a standard as nearly as possible to original or new condition in appearance, performance, and life expentancy. This is accomplished through complete disassembly of the item, inspection of all parts or components, repair or replacement of worn or unserviceable elements (items) using original manufacturing tolerances and specifications, and subsequent reassembly of the item.

d. Tools and Equipment, Column (4). This column is provided for referencing by code the special tools and test equipment, (sec. III) required to perform the maintenance functions (sec. II).

e. Remarks, Column (5). This column is provided for referencing by code the remarks (Section IV) pertinent to the maintenance functions.

C–3. Explanation of Columns in Section III

a. Reference Code. This column consists of a number and a letter separated by a dash. The number references the T&TE (Tools and Test Equipment) requirements column on the MAC. The letter represents the specific maintenance function the item is to be used with. The letter is representative of columns A through K on the MAC.

b. Maintenance Level. This column shows the lowest level of maintenance authorized to use the special tool or test equipment.

c. Nomenclature. This column lists the name or identification of the tool or test equipment.

d. Tool Number. This column lists the manufacturer's code and part number, or Federal Stock Number of tools and test equipment.

C–4. Explanation of Columns in Section IV

a. Reference Code. This column consists of two letters separated by a dash, both of which are references to section II. The first letter references column 5 and the second letter references a maintenance function, column 3, A through K.

b. Remarks. This column lists information pertinent to the maintenance function being performed, as indicated on the MAC, section II.

Section II. MAINTENANCE ALLOCATION CHART

(1)	(2)	(3) Maintenance functions											(4)	(5)
		A	B	C	D	E	F	G	H	I	J	K		
Group No.	Functional group	Inspect	Test	Service	Adjust	Aline	Calibrate	Install	Replace	Repair	Overhaul	Rebuild	Tools and equipment	Remarks
01	**ENGINE**													
0100	Engine Assembly:													
	Engine diesel	O	F	O					F	F	H	D		A
0101	Block Cylinder Head:													
	Block								D	D		D		
	Cylinder head								F	H		D		
0102	Crankshaft:													
	Crankshaft	H							D			D		B
0103	Flywheel Assembly:													
	Flywheel assembly								H	H				
	Housing	O							H	H				
0105	Valves, Camshafts and Timing Systems:													
	Arm, rocker				O				F	F				
	Cover, cylinder head								F	F				
	Valves, lifters	F			O				F					
	Seat insert	F							H	F				C
0106	Engine Lubricating System:													
	Breather			O					O					
	Filter, oil			O					O					
	Pan, oil								H	H				
	Pump, oil								H	H				
0108	Manifolds:													
	Manifolds	O							F					
0109	Accessory Drive Mechanism:													
	Accessory drive								H					
	Pulley drive	O							F					
03	FUEL SYSTEM:													
0301	Fuel Injector:		F		O				O					
	Injector, fuel									F		D	1	
0302	Fuel Pumps:													
	Pump, fuel								F			D		
0304	Air Cleaner:													
	Cleaner, air			O					O	O				
0305	Turbocharger:													
	Turbocharger								O			H		
	Hose & Clamps	O							O					

(1)	(2)	(3) Maintenance functions											(4)	(5)
		A	B	C	D	E	F	G	H	I	J	K		
Group No.	Functional group	Inspect	Test	Service	Adjust	Aline	Calibrate	Install	Replace	Repair	Overhaul	Rebuild	Tools and equipment	Remarks
Fuel System—Continued														
0306	Tanks, Lines, Fittings:	..	..	..	..	..	..	..	O					
	Tank, fuel	O	..	O	..	..	..	..	F	F				
0309	Fuel Filters													
	Filters, fuel	..	..	O	..	..	..		O					
0311	Engine Starting Aids:													
	Aids, starting	.	..	O	..	..	..	..	O					
0312	Accelerator, Throttle Controls:													
	Control, accelerator throttle	..	..	..	O	..	..	..	O					
05	COOLING SYSTEM:													
0501	Radiator:													
	Radiator	C	..	O	..	..	..	..	O	H				
	Brille	..	..	..	..	..	..	..	O	F				
0503	Thermostat and Housing Gaskets:													
	Thermostats	..	O	..	..	..	..	..	O					
0504	Water Pump:													
	Belt	C	..	..	O	..	..	..	O					
	Pump	..	..	O	..	..	..	..	F	F				
0505	Fan Assembly:													
	Belt	C	..	..	O	..	..	..	O					
	Hub assembly	..	..	..	..	..	..	..	F	F				
0508	Water Filter													
06	ELECTRICAL SYSTEM:													
	Generator:													
	Belt	C	..	..	O	..	..	..	O					
	Generator	..	O	..	..	..	..	..	O	F	..	H		
0603	Starting Motor:													
	Brushes, solenoid	..	..	..	..	..	..	..	F	F				
	Motor, starting	..	O	..	..	..	..	..	O	F	..	H		
0609	Lamps	..	..	..	..	..	..	..	O					
0612	Batteries:													
	Batteries	C	O	O	..	..	..	..	O					
0613	Chassis Wiring Harness:													
	Harness	..	..	..	..	..	..	..	F	O				
07	TRANSMISSION													
0705	Gear Shift & Controls:													
	Levers & linkage	..	..	..	O	..	..	..	O					

0708	Torque Converter:												
	Torque converter	--	--	--	--	--	--	--	F	H	--	D	
0710	Transmission Assembly:												
	Transmission assembly	--	F	·O	--	--	--	--	F	H	--	D	
	Breather	--	--	O	--	--	--	--	O				
0713	Intermediate Clutch:												
	Low, high & reverse clutch	--	--	--	--	--	--	--	D	--	--	D	
0719	Reduction & Transfer Gears:												
	Gears, shafts, bearings	--	--	--	--	--	--	--	D	D			
0720	Accessory Drive:												
	Accessory drive	--	--	--	--	--	--	--	H	H			
0721	Coolers, Pumps												
	Pump	--	--	--	--	--	--	--	H	--	--	D	
	Filter element	--	--	O	--	--	--	--	O				
09	PROPELLER SHAFTS												
0900	Propeller Shafts:												
	Shafts, propeller	--	--	O	--	--	--	--	O	H			
10	FRONT AXLE												
1000	Front Axle Assembly:												
	Axle assembly, front	O	--	O	--	--	--	--	F	H	--	D	
	Breather	--	--	O	--	--	--	--	O				
1002	Differentials:												
	Differential assembly	--	--	O	--	--	--	--	F	H	--	D	
1003	Planetary or Final Drive:												
	Planetary drive	--	--	O	--	--	--	--	F	F	H		
11	REAR AXLE												
1100	Rear Axle Assembly:												
	Axle assembly, rear	--	--	O	--	--	--	--	F	H	--	D	
	Breather	--	--	O	--	--	--	--	O				
1102	Differential:												
	Differential assembly												
1103	Planetary or Final Drive:												
	Planetary drive	--	--	O	--	--	--	--	F	F	H		
12	BRAKES												
1201	Hand Brakes:												
	Brake, hand	--	--	O	O	--	--	--	O	F			
	Levers, linkage	--	--	O	O	--	--	--	O				
1202	Service Brakes:												
	Brakes, service	--	--	--	O	--	--	--	F	F	H		
1204	Hydraulic Brake System												
	Power cluster	--	--	O	--	--	--	--	F	--	H		
	Cylinder wheel	--	--	--	--	--	--	--	F	--	H		
1208	Air Brake System:												
	Chamber, valves	--		--	--	--	--	--	F	--	H		
	Reservoir, air	--	-	O	--	--	--	--	F				

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(1) Group No.	(2) Functional group	(3) Maintenance functions A Inspect	B Test	C Service	D Adjust	E Aline	F Calibrate	G Install	H Replace	I Repair	J Overhaul	K Rebuild	(4) Tools and equipment	(5) Remarks
Brakes—Continued														
1209	Air Compressor Assembly:													
	Compressor assembly	..	..	..	..	..	..	..	F	F	H			
	Governor	..	..	..	O	..	..	..	F					
13	WHEELS													
1311	Wheel Assembly:													
	Drums	..	..	..	..	..	..	..	F	F				
1313	Tires:													
	Tires	O	..	O	..	..	..	..	O	O	..	D		
14	STEERING													
1401	Steering Assembly:													
	Link, drag, rod, tie	..	..	O	..	..	..	..	O					
	Steering assembly	O	..	O	F	..	..	..	F	F				
1410	Hydraulic Pump Assembly:													
	Pump, steering	..	..	..	..	..	..	..	O	..	H			
1412	Hydraulic Cylinders:													
	Cylinder, steering	..	..	..	..	..	..	..	O	H				
1414	Steering System Valves:													
	Valves, steering	..	..	..	..	..	..	..	F	H				
15	FRAME													
1501	Frame Assembly													
	Pins & bushings, pivot	..	..	..	F	..	..	..	F					
18	BODY, HOOD													
1801	Body, Hood Assemblies:													
	Hood, panels, shroud	..	..	..	..	..	..	..	O	F				
1805	Floors:													
	Floors	..	..	..	..	..	..	..	O	F				
1806	Seats:													
	Seats	..	..	..	..	..	..	..	O	F				
1808	Boxes:													
	Box tool	..	..	..	..	..	..	..	O	F				
43	HYDRAULIC SYSTEM													
4300	Hydraulic System	O	..	O										
4301	Strainers, Filters, Hoses, Pipe Fittings, Tubing:													
	Filter assembly	..	..	O	..	..	..	..	O					

4302	Pump & Pump Drives:											
	Pump	..	..	..	..	.	..	..	F	H		
4305	Manifold and/or Control Valves:											
	Valves	..	..	..	..	..	..	..	F	H		
4307	Hydraulic Cylinders:											
	Cylinders, hydraulic	..	..	..	..	..	..	..	O	..	H	
4308	Reservoirs:											
	Breather	..	..	O	..	..	..	..	O			
	Reservoir	..	..	O	..	..	..	..	F	F		
4309	Manual Controls											
	Levers linkages	..	..	..	O	..	..	..	O			
50	PNEUMATIC EQUIPMENT											
5001	Crankcase, Block											
	Cylinder Head:											
	Crankcase or block	.	..	.	..	..	..	..	H	H		
	Cylinder head	..	..	..	..	..	..	..	F	H		
5004	Piston, Connecting Rods	..	..	..	..	..	..	..	H	H		
5007	Compressor Drives	..	..	..	O	..	..	..	O	O		
	Drive Belts	..	..	..	C	..	..	..	O			
5009	Unloader System:											
	Governor	..	..	..	O	..	..	..	O			
74	EARTH MOVING EQUIPMENT COMPONENTS											
7436	Lift Arms & Pivot Assemblies:	..	..	..	..	..	..	..	F			
	Bar, boom, carrier	..	..	O	..	..	..	..	H	F		
7437	Moldboard Assemblies:											
	Shafts, pins, latches, bucket	..	..	O	O	..	..	..	O	O	F	
76	FIRE FIGHTING EQUIPMENT COMPONENTS											
7603	Fire Extinguisher:											
	Extinguisher, Fire	..	..	O	..	..	..	..	O			

Section III. SPECIAL TOOL AND SPECIAL TEST EQUIPMENT REQUIREMENTS

Reference code	Maintenance level	Nomenclature	Tool No.
I–D	O	Wrench, Torque, 3/8 inches sq Drive, 150 in. lb. Cap	5120–230–6380
I–D	O	Screwdriver, 3/8 inches sq Drive	

Section IV. REMARKS

Reference code	Remarks
A–B	Test includes operation and compression
B–K	Repair of crankshaft includes metaling, alineing and grinding.
C–I	Repair of seat inserts includes refacing.

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By Order of the Secretary of the Army:

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